Georgia Strait Crossing Project

Draft Supplemental EIS

Prepared for:

Department of Ecology

Prepared by:

Shapiro and Associates, Inc.

September 24, 2003

September 24, 2003

Dear Reviewers and Interested Parties:

Re: Draft Supplemental Environmental Impact Statement for the proposed Georgia Strait Crossing natural gas pipeline project

The Washington Department of Ecology (Ecology) has completed the draft supplemental environmental impact statement (DSEIS) for the Georgia Strait Crossing natural gas pipeline project. Georgia Strait Crossing Pipeline LP (GSX) is the proponent of the project.

GSX proposes to construct and operate approximately 47 miles of 20- and 16-inch-diameter pipeline (33.4 miles onshore, 13.9 miles offshore) in Whatcom and San Juan Counties, Washington for transporting natural gas. The project also includes construction and operation of the Sumas Interconnect Facility, which includes a receipt point meter station, pig launcher, interconnect piping, and mainline valve (MLV); and the Cherry Point Compressor Station, which includes a 10,302-horsepower compressor unit, pig launcher/receiver, MLV, and a tap valve. Four additional MLVs are required to be installed along the pipeline route. In addition to the tap valve at the Cherry Point Compressor Station, a second tap valve would be installed offshore. The proposed facilities would have an initial design capacity of 95,700 decatherms per day.

The DSEIS supplements the July 2002 environmental impact statement (EIS) prepared by the Federal Energy Regulatory Commission (FERC) and the U.S. Army Corps of Engineers (Corps) for the Georgia Strait Crossing Project. The EIS prepared by the FERC and the Corps addressed some, but not all of the probable significant adverse environmental impacts of the proposed project. Ecology will be adopting the EIS prepared by the FERC and the Corps and prepared the DSEIS to address the remaining probable significant environmental impacts of the proposed project.

Elements of the environment analyzed in the DSEIS include water quality and use, wetlands, wildlife and fisheries, and historic resources. Other issues analyzed include pipeline safety, seismic hazards, pipeline noise, and consistency with local plans and policies. On September 20, 2002, GSX was issued a Certificate of Public Convenience and Necessity (Certificate) from the FERC for the proposed route and associated facilities. Consequently, locations for the pipeline and associated facilities other than that authorized by the Certificate are not feasible and are not considered as alternatives.

As the lead agency for the implementation of the State Environmental Policy Act (SEPA), Ecology is using the DSEIS as an assessment tool for determining potential environmental impacts of pipeline siting, construction and operation, including spill response. Also evaluated in the DSEIS are cultural and historic considerations of the proposed route.

Interested groups and individuals are encouraged to submit comments on the environmental impacts described in the DSEIS. The document is also available for viewing at local libraries, Ecology offices in Bellevue and Bellingham, Ecology's web site at www.ecy.wa.gov/programs/sea/gsx, and the proponent's web site, www.georgiastrait.twc.com. Comments received will be used to prepare a final SEIS.

Please carefully follow these instructions to ensure that your comments are received in time and are properly recorded:

Please send your comments to:

Sheila Hosner
WA State Department of Ecology
3190 160th Avenue SE
Bellevue, WA 98008-5452
shos461@ecy.wa.gov
Fax: 425-649-7098

Comments on this document must be postmarked, or received by email or Fax, by October 25, 2003.

For further information, or to obtain additional copies of this document, please contact **Sheila Hosner** at **(425) 649-4310**. If you require this document in an alternative format, please call Sheila, or 711, or 1-800-833-6388 (TTY).

Sincerely,

Raymond Hellwig
Regional Director
WA State Department of Ecology, NWRO
RH:sh:ll

DETERMINATION OF SIGNIFICANCE
AND ADOPTION OF EXISTING
ENVIRONMENTAL DOCUMENT

Description of current proposal: Georgia Strait Crossing Project. The proposed action is the Georgia Strait Crossing (GSX) Pipeline. The U.S. portion of the pipeline is part of a larger project jointly sponsored by British Columbia Hydro and Power Authority (BC Hydro) and Williams Gas Pipeline Company. The project calls for the design, construction, and operation of two interconnecting natural gas pipelines, one in Canada and one in the U.S. The pipelines will transport natural gas from Sumas, Washington, to Vancouver Island, British Columbia. The pipeline is a component of the proposed Vancouver Island Generation Project (VIGP), also proposed by BC Hydro, that would build a gas-fired power plant on Vancouver Island. The GSX pipeline would supply gas to the power plant.

Proponent: Georgia Strait Crossing Pipeline LP (GSX-US)/BC Hydro

Location of current proposal: The GSX-US portion of the pipeline would transport natural gas from existing pipeline systems at the United States-Canada border near Sumas, Washington, through Whatcom and San Juan Counties to an interconnection with the GSX-Canada pipeline at Boundary Pass in the Strait of Georgia. The GSX-Canada portion of the pipeline would extend 37.2 miles (27.5 miles offshore and 9.7 miles onshore) from its interconnection with the GSX-US pipeline at Boundary Pass to an interconnection with an existing pipeline operated by Terasen Gas on Vancouver Island south of Duncan.

Title of document being adopted: Georgia Strait Crossing Project Final Environmental Impact Statement (FEIS) prepared under the National Environmental Policy Act (NEPA).

Agency that prepared document adopted: Federal Energy Regulatory Commission (FERC).

Date adopted document was prepared: July 2002

Description of document being adopted: FEIS for same proposal, the entire document including response to comments and appendices is being adopted

If the document being adopted has been challenged (WAC 197-11-630), please describe: An appeal has been filed challenging the adequacy of the FERC NEPA FEIS

The document is available to be read at: Department of Ecology, Northwest Regional Office, 3190 160th Ave. SE, Bellevue, WA, 98008-5452

EIS Required: The lead agency has determined this proposal is likely to have a significant adverse impact on the environment. To meet the requirements of RCW 43.21C.030(2)(c), the lead agency is adopting the document described above. Under WAC 197-11-360, there will be no scoping process for the adopt EIS. We have identified and adopted this document as being appropriate for this proposal after independent review. We have determined that a Supplemental Environmental Impact Statement is necessary in addition to the adopted document.

Name of agency adopting document: Washington Department of Ecology

Contact person: Sheila Hosner, email - shos461@ecy.wa.gov

Responsible official: Ray Hellwig, Northwest Regional Director

Address: 3190 160th Ave. SE, Bellevue, WA, 98008-5452

Date: Sept 25, 2003 **Signature:**

FACT SHEET

Project Title

Georgia Strait Crossing Project

Proposed Action

The proposed action is the Georgia Strait Crossing (GSX) Pipeline. The U.S. portion of the pipeline is part of a larger project jointly sponsored by British Columbia Hydro and Power Authority (BC Hydro) and Williams Gas Pipeline Company. The project calls for the design, construction, and operation of two interconnecting natural gas pipelines, one in Canada and one in the U.S. The pipelines will transport natural gas from Sumas, Washington, to Vancouver Island, British Columbia.

The pipeline is a component of the proposed Vancouver Island Generation Project (VIGP), also proposed by BC Hydro, that would build a gas-fired power plant on Vancouver Island. The GSX pipeline would supply gas to the power plant. On September 8, 2003, the British Columbia Utilities Commission (BCUC) denied the VIGP application and recommended that BC Hydro proceed with a new analysis of alternatives to supply Vancouver Island's energy needs. At this time, the effects of the BCUC ruling on the U.S. portion of the GSX project are uncertain.

Alternatives

Terasen Gas Alternative – Under this alternative, Terasen Gas Vancouver Island (TGVI) would undertake phased expansion of its current natural gas distribution system that serves Vancouver Island. This includes construction of up to three new compression stations, pipeline looping of approximately 45.7 miles of existing pipeline, and construction of a liquid natural gas facility with a storage capacity of 1 billion standard cubic feet.

No Action Alternative – Under the No Action Alternative, the GSX pipeline would not be constructed. Without the pipeline, other projects may assist in reducing the demand for natural gas on Vancouver Island. An example is a proposal by Norske Skog Canada Limited (NorskeCanada). NorskeCanada has proposed installing new electrical power cogeneration facilities at three of its mills, combined with energy conservation and demand management practices.

Proponent	Georgia Strait Crossing Pipeline LP (GSX-US)/BC Hydro
Lead Agency and Responsible Official	Ray Hellwig, Regional Director Northwest Regional Office Department of Ecology 3190 160th Avenue SE Bellevue, WA 98008-5452
Lead Agency Contact Person	Sheila Hosner Northwest Regional Office Department of Ecology 3190 160th Avenue SE Bellevue, WA 98008-5452 (425) 649-4310
Permits and Approvals	**Washington Department of Ecology** Section 401 Water Quality Certification Storm Water Discharge Permit Point Source Discharge Permit Coastal Zone Management Act consistency determination State Clean Water Act (RCW 90.48) Solid Waste Disposal Coastal Zone Management Program Permit to Appropriate Water State Environmental Policy Act **Washington Department of Fish and Wildlife** Hydraulic Project Approval - freshwater and marine State Aquatic Nuisance Species Act **Washington State Department of Transportation** Road crossing permits **Washington Department of Community, Trade, and Economic Development** Growth Management Act consistency Implementation of Section 106, National Historic Preservation Act

Washington Department of Natural Resources

Aquatics Land Lease
Forest Practices Act compliance

Whatcom County

Conditional Use Permit
Shoreline Substantial Development Permit
Critical Areas Ordinance
Road Crossing Permits
Waste Management
Comprehensive Plan Amendment
Zoning Reclassification

San Juan County

Shoreline Substantial Development Permit

Draft Supplemental EIS Authors and Principal Contributors

This Draft Supplemental EIS was prepared for the Washington Department of Ecology, the SEPA Lead Agency.

Shapiro and Associates, Inc. prepared the Draft Supplemental EIS.

Shapiro and Associates, Inc.
101 Yesler Way, Suite 400
Seattle, WA 98104

Date Draft Supplemental EIS Issued

September 24, 2003

Public Meetings on Draft Supplemental EIS

October 14 and 15, 2003

Due Date for Comments on Draft Supplemental EIS

October 25, 2003

Location of Background Material

Department of Ecology
Northwest Regional Office
3190 160th Avenue SE
Bellevue, WA 98008-5452

To Obtain a Copy of the Draft Supplemental EIS

Copies of the Draft Supplemental EIS are available for public review at the following locations:

Department of Ecology
Northwest Regional Office
3190 160th Avenue SE
Bellevue, WA 98008-5452

Copies of the Draft Supplemental EIS can also be obtained by telephone at (425) 649-4310 or through mail orders. Please send your request to:

Department of Ecology
Northwest Regional Office
3190 160th Avenue SE
Bellevue, WA 98008-5452
Attention: Sheila Hosner

Copies of the Draft Supplemental EIS also will be available on Ecology's and GSX-US's Web sites and at the following local libraries: Ferndale, Sumas, Lynden, and San Juan.

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1. SUMMARY

1.1 PROJECT BACKGROUND

Georgia Strait Crossing Pipeline LP (GSX-US) proposes to construct and operate a natural gas pipeline from the Canadian border near Sumas, Washington, to the United States-Canada border at Boundary Pass, where it would connect with its Canadian counterpart (GSX-Canada) and continue on to Vancouver Island, British Columbia. Both pipelines are a joint undertaking of Williams Pipeline Company and British Columbia Hydro and Power Authority (BC Hydro).

The pipeline is a component of the proposed Vancouver Island Generation Project (VIGP), also proposed by BC Hydro, that would build a gas-fired power plant on Vancouver Island. That power plant would be supplied with gas from the Georgia Strait Crossing (GSX) pipeline. On September 8, 2003, the British Columbia Utilities Commission (BCUC) denied the VIGP application for approval and recommended that BC Hydro proceed with a new analysis of alternatives to supply Vancouver Island's energy needs (BCUC 2003). At this time, the effects of the BCUC ruling on the GSX-US project are uncertain.

1.1.1 Federal and State Review

The Federal Energy Regulatory Commission (FERC) prepared and issued a Final Environmental Impact Statement (EIS) for the GSX-US project on July 17, 2003. The EIS was prepared under the guidelines of the National Environmental Policy Act (NEPA). The GSX-Canada portion of the project is undergoing simultaneous environmental review by the National Energy Board of Canada.

In December of 2002, the Washington Department of Ecology (Ecology) initiated a process to evaluate whether the project's Final EIS, which meets NEPA standards, also meets the environmental review requirements under the State Environmental Policy Act (SEPA). To determine whether the project's existing NEPA EIS could be adopted to meet the requirements of SEPA, Ecology was required to conduct an independent review of the NEPA document.

As a result of that process, Ecology determined that 39 issues in the Final EIS were not adequately addressed to satisfy SEPA requirements. On July 28, 2003, Ecology gave GSX-US the list of issues that would need to be addressed in a Supplemental EIS.

1.2 PROPOSED ACTION AND ALTERNATIVES

The proposed action is the GSX-US portion of the Georgia Strait Crossing pipeline. The GSX-US pipeline is part of a larger project jointly sponsored by BC Hydro and Williams Gas Pipeline Company. The GSX project consists of two integral parts. The GSX-US portion of the pipeline would transport natural gas from existing pipeline systems at the United States-Canada border near Sumas, Washington, to an interconnection with the GSX-Canada pipeline at Boundary Pass in the Strait of Georgia. The GSX-Canada portion of the pipeline would extend 37.2 miles from its interconnection with the GSX-US pipeline at Boundary Pass to an interconnection with an existing pipeline operated by Terasen Gas on Vancouver Island south of Duncan.

1.2.1 Terasen Gas Alternative

Under this alternative, Terasen Gas Vancouver Island, Inc. (TGVI) would undertake phased expansion of its current natural gas distribution system serving Vancouver Island. This includes construction of up to three new compression stations, pipeline looping ("twinning") of 45.7 miles of existing pipeline, and construction of a liquid natural gas (LNG) facility with a storage capacity of 1 billion standard cubic feet (Bcf).

1.2.2 No Action Alternative

Under the No Action Alternative, the GSX pipeline would not be constructed. Without the proposed pipeline, other projects may assist in reducing the demand for natural gas on Vancouver Island. An example is a proposal by NorskeCanada. NorskeCanada proposes to install new electrical power cogeneration facilities at three of its mills, in combination with energy conservation and demand management.

1.3 DOCUMENT ORGANIZATION

This Draft Supplemental EIS is organized as follows:

- Chapter 1 contains a summary of the project background, the proposal and alternatives, and issues and responses.
- Chapter 2 presents a detailed description of the proposed GSX project, the Terasen Gas Alternative, and the No Action Alternative.
- Chapter 3 contains the responses to the specific issues, organized by element of the environment.
- Chapter 4 contains a list of references used in preparation of the document.
- Chapter 5 contains the distribution list for the Draft Supplemental EIS.

1.4 SUMMARY OF ISSUES AND RESPONSES

Table 1-1 presents a summary of the issues addressed in this Draft Supplemental EIS. The issues appear under the corresponding topic or element of the environment. Each section contains a summary of the issue, Ecology's recommendation, and the responses contained in this Draft Supplemental EIS.

Table 1-1: Summary of Issues and Responses

Project Description		
Issue 1	Description of Problem The current version of the proposed project should be evaluated and subject to public review.	Ecology Requirement Include revised alignment sheets, including adopted route variations and alternative site B for the Cherry Point compressor station, in SEPA document.
	Action The project description in Chapter 2 reflects the current proposal by GSX-US.	
Issue 2	Description of Problem GSX-US should prepare a site-specific plan for launching the HDD pipe string.	Ecology Requirement Include a drawing for the Gulf Road launch plan in the SEPA document along with language explaining the process.
	Action The project description in Chapter 2 includes a discussion of the launch plan for the HDD pipe string and the site plan in Figure 2-2.	
Issue 3	Description of Problem The NorskeCanada and Terasen Gas proposals that have surfaced as part of the Vancouver Island Generation Project are not discussed in the FERC EIS.	Ecology Requirement Include descriptions and evaluations of the Terasen Gas and NorskeCanada alternatives in the Supplemental EIS.
	Action Chapter 2 includes descriptions of the Terasen Gas and NorskeCanada proposals, and the Terasen Gas Alternative is assessed (to the extent information is available) in Chapter 3, Affected Environment, Significant Impacts, and Mitigation Measures.	
Geology and Soils		
Issue 1	Description of Problem The FERC Final EIS did not address currently active faults in the project area and did not address the potential for soil liquefaction along certain segments of the route.	Ecology Requirement Include an additional figure identifying potentially active faults, a discussion of impacts resulting from potential pipeline rupture, and mitigation measures.
	Action Figure 3.2-1 shows the Vedder and Sumas Mountain faults in relation to the pipeline alignment. The projected location of the Vedder Mountain Fault is approximately 1 mile east of, and parallel to, the proposed pipeline alignment. The projected location of the Sumas Fault crosses the proposed pipeline route somewhere between Milepost 5 and Milepost 8. Section 3.2 also includes a summary of potential seismic impacts from the GSX-Canada environmental assessment.	
Issue 2	Description of Problem The FERC Final EIS does not adequately respond to Ecology's Draft EIS comment requesting the name and location of waterbodies with potential scour impacts.	Ecology Requirement Discuss locations of waterbodies with potential scour impacts in the environmental review.
	Action The Draft Supplemental EIS contains a summary of potential impacts from stream bottom scour for different sizes of waterbodies in the project area.	

Table 1-1: Continued

Surface Water		
Issue 1	Description of Problem The discussion of existing surface water quality conditions is inadequate, and should include at a minimum a discussion of the nine waterbodies impaired under 303(d).	Ecology Requirement Expand discussion of existing surface water conditions to allow a reasonable assessment of potential impacts in the environmental review.
	Action Table 3.3-1 summarizes the six waterbodies impaired under Section 303(d). The accompanying discussion also summarizes the analyses and conclusions regarding water quality impairment from Resource Report 2, Water Use and Quality, in Exhibit F-1 of GSX-US's original application to FERC.	
Issue 2	Description of Problem The discussion of construction impacts in the Final EIS does not include dewatering impacts.	Ecology Requirement Include a more thorough analysis and discussion of the potential effects of dewatering activities on surface water and groundwater, including impacts on stream flows in the environmental review.
	Action Water would be pumped out of the trench and discharged to the ground in a manner that does not cause erosion to the ground surface or allow unfiltered flow into wetlands, streams, or lakes. To achieve this, water pumped out of the trench would be discharged to a well-vegetated upland site through a temporary dewatering structure such as a hay bales or a filter bag. Water would not be pumped directly to surface waters. At no time would dewatering exceed 10% of the receiving water volume (see Section 3.3.3).	
Issue 3	Description of Problem The open-cut method as an alternative crossing method is not discussed in the contingency plan.	Ecology Requirement Describe the contingency plan in the environmental review and have in place before construction begins.
	Action GSX is not requesting approval for an open-cut alternative because the horizontal directional drill (HDD) method will be used to install the shore crossing for the Georgia Strait Crossing Project near Cherry Point, Washington. Based on its own extensive studies, GSX-US has concluded that the HDD shore approach at Cherry Point is achievable with nearly 100% probability of success and is the primary and preferred method to construct the shore crossing. The Draft Supplemental EIS does, however, contain a brief discussion of the contingency to be used if the HDD is not initially successful (see Section 3.3.4).	
Issue 4	Description of Problem The Final EIS does not elaborate on or evaluate criteria for wet ditch versus dry ditch excavation.	Ecology Requirement Discuss the criteria to be used for selecting the wet ditch method in the environmental review and expand discussion of the impacts of that approach.
	Action The Draft Supplemental EIS includes an overview of the wet-ditch method and potential impacts (see Section 3.3.5).	

Table 1-1: Continued

Issue 5	Description of Problem The Final EIS does not adequately discuss the potentially significant adverse impacts of operating clearing equipment through perennial waterbodies.	Ecology Requirement FERC Condition No. 14 prohibits equipment crossing through perennial waterbodies unless otherwise approved by FERC.
	Action FERC Environmental Condition No. 14 prohibits equipment crossing through perennial waterbodies unless otherwise approved by FERC in the Implementation Plan. GSX-US will not propose that FERC approve equipment crossing (fording) through perennial streams. GSX-US has revised its Wetland and Waterbody Crossing Procedures to state that clearing crews are to fording perennial streams (see Section 3.3.6).	
Issue 6	Description of Problem The Final EIS does not provide justification for why open-cut crossings of 303(d)-impaired waterbodies would not have an adverse effect.	Ecology Requirement Provide supporting documentation for the conclusion that open-cut crossings would have no adverse impacts in the environmental review.
	Action The GSX project would cross six waterbodies that are listed as 303(d)-impaired. Of these, three would be crossed with trenchless installation methods, such as HDD or conventional boring. The other three would be crossed using open-cut installation methods. Additional discussion of potential adverse effects associated with both methods is included in the Draft Supplemental EIS (see Section 3.3.7).	
Issue 7	Description of Problem The Final EIS does not adequately address the potential for continued erosion of the (hydrostatic testing) discharge area if it is not properly stabilized after the discharges have been completed.	Ecology Requirement Include an expanded discussion of hydrostatic test water discharge in the Supplemental EIS and evaluate potential effects of erosion and mitigation measures.
	Action Hydrostatic test water would be discharged through an approved dewatering structure and energy-dissipating device in a manner to minimize disturbance to the environment. Water would be discharged from the pipeline so as not to cause erosion to the ground surface or unfiltered flow into wetlands, streams, or lakes. GSX-US would require samples to be taken of the test water prior to filling or dewatering the pipeline. Water discharge rates would be designed for site conditions. The Draft Supplemental EIS summarizes the methods and potential effects at two hydrostatic test water discharge sites: the existing Sumas compressor station and the proposed Cherry Point compressor station.	
Issue 8	Description of Problem The Final EIS does not include a discussion of a site-specific plan for the HDD at Cherry Point.	Ecology Requirement Given the sensitive nature of the Cherry Point shoreline, include the site-specific plan for the HDD at this location in the environmental review.
	Action The Draft Supplemental EIS (Section 3.3.9) includes an overview of the HDD process, potential impacts, and mitigation measures to be used. The discussion focuses on two areas of disturbance: one onshore drill entry hole and one offshore drill exit hole.	
Groundwater		
Issue 1	Description of Problem The Final EIS does not provide a map of water supply well locations or address potential impacts.	Ecology Requirement Evaluate and document the locations of private wells within 200 feet and municipal wells within 400 feet of the project.
	Action The Draft Supplemental EIS (Section 3.4.2) contains a reference to the map of groundwater wells contained on page 2-5 of Resource Report 2, Water Use and Quality, of Exhibit F-1 of GSX-US's original application to FERC.	

Table 1-1: Continued

Plants and Animals		
Issue 1	Description of Problem The Final EIS conclusion that turbidity will not affect salmonids or other ocean fish is not documented.	Ecology Requirement Provide citations of the appropriate literature to support the above conclusion in the environmental review.
	Action A list of references from pages 3-63 and 3-65 of the FERC Final EIS has been included in the Draft Supplemental EIS (see Section 3.5.2).	
Issue 2	Description of Problem The FERC response to Draft EIS comments LA1-13 and 14 with respect to non-listed federal and state species is not adequate.	Ecology Requirement Summarize and include information from Appendix 3-1 of Resource Report 3 in GSX-US's original application to FERC and other surveys in the SEPA document.
	Action Information on marine fish in the project area was provided in Resource Report 3, Fish, Wildlife, and Vegetation, and Appendix 3-1, Section 2.2 in Exhibit F-1 of GSX-US's original application to FERC. The references to the technical studies have been included in the Draft Supplemental EIS (Section 3.5.3).	
Issue 3	Description of Problem The Final EIS does not discuss impacts on the fishing industry and specifically the potential significant impact on the bottom trawl fishery.	Ecology Requirement Include a discussion of fishing issues, impacts, and mitigation measures in the environmental review.
	Action A detailed summary of potential impacts on the fishing industry and mitigation measures for both the GSX-US and GSX-Canada projects has been included in the Draft Supplemental EIS (Section 3.5.3).	
Issue 4	Description of Problem The Final EIS does not contain conclusions about the potential to increase or decrease the prevalence of noxious weeds/invasive species in the project area.	Ecology Requirement In the environmental review, identify the noxious weeds observed during field surveys and analyze impacts to fully discuss the potential effects of this project.
	Action The Draft Supplemental EIS (Section 3.3.5) references Table 3.3-2 on page 3-65 of the FERC Resource Report 3, Fish, Wildlife, and Vegetation, which identifies the noxious weeds observed during resource surveys. The resource report also describes where noxious weeds are most concentrated in the project area.	
Issue 5	Description of Problem The Final EIS does not assess potential impacts of four access roads and the Gulf Road pipe string fabrication on wetlands.	Ecology Requirement In the SEPA document, include information from the Preliminary Construction Alignment Sheets regarding the change of the access road to avoid wetlands.
	Action The Draft Supplemental EIS (Section 3.5.6) summarizes GSX-US's revisions to its plans to avoid the placement of fill for access roads in wetlands. In one case, GSX relocated an access road from outside the construction right-of-way to within the right-of-way in order to avoid placement of fill in a wetland. The revised access road alignments are shown on the updated Preliminary Construction Alignment Sheets.	

Table 1-1: Continued

Issue 6	Description of Problem The Final EIS doesn't include the compensatory wetland mitigation plan filed with the U.S. Army Corps of Engineers and Ecology.	Ecology Requirement GSX-US will provide a summary of the wetland restoration plan for inclusion in the SEPA document.
	Action The Draft Supplemental EIS (Section 3.5.7) includes a detailed summary of GSX-US's compensatory mitigation plan for wetlands and riparian areas.	
Issue 7	Description of Problem The Final EIS did not adequately address potential impacts on marine vegetation and animals/organisms from the HDD.	Ecology Requirement Perform a survey and impact analysis of marine vegetation and animals/organisms at the HDD site, and prepare and summarize a mitigation plan in the SEPA document.
	Action An analysis of potential impacts on marine vegetation and animals/organisms is included on page 3-83 of the FERC Final EIS. A discussion of existing conditions and potential impacts on marine fisheries, wildlife, and vegetation resources is also includes in Resource Report 3, Fish, Wildlife, and Vegetation, of Exhibit F-1 of GSX-US's original application to FERC. The results of a survey of marine vegetation and animals/organisms in the nearshore environment are included in Appendix 3-1 of Resource Report 3 (see Section 3.5.8).	
Issue 8	Description of Problem Measures to protect bald eagles do not include avoidance of important breeding and wintering forage periods when GSX-US would conduct pipeline maintenance.	Ecology Requirement Summarize information from Resource Report 3 and from WDFW's Bald Eagle Management Plan in the Supplemental EIS.
	Action Given their proximity, construction and operation of the proposed pipeline is very likely to disturb bald eagles that are actively breeding at the California Creek nest or roosting adjacent to Bertrand Creek. While bald eagles have shown considerable ability to acclimate to ongoing human activities, the proposed construction would be an unusual activity that does not normally occur near the California Creek territory. Therefore, the activity would be more likely to disturb breeding birds (see Section 3.5.9).	
Issue 9	Description of Problem Assumptions regarding temporary forest habitat impacts are incorrect and forest fragmentation effects on wildlife are not quantified.	Ecology Requirement In the environmental analysis, include data, a map, and discussion on what forested stands of significant size (if any) are fragmented.
	Action Based on a review of the most recent project maps, as well as aerial photographs of the project alignment and project vicinity, two large and relatively contiguous forested stands would be fragmented by the proposed pipeline right-of-way. The proposed pipeline right-of-way would convert from 6 to 15 acres of the two forested stands (see Section 3.5.10).	
Issue 10	Description of Problem The Final EIS does not adequately cite sources of information concerning marine mammals and their relationship to underwater noise.	Ecology Requirement Provide complete references for all citations in the environmental review.
	Action An additional reference was provided and included in Section 3.5.11 of the Draft Supplemental EIS.	

Table 1-1: Continued

Reliability and Safety		
Issue 1	Description of Problem Pipeline protection measures need further discussion and clarification; emergency situation delay response time information is not adequate.	Ecology Requirement More specifically address protection measures, including a discussion of how the gas from valve to valve is managed in an emergency situation.
	Action The Draft Supplemental EIS (Section 3.6.2) contains a detailed summary of measures describing how the pipeline would be designed, constructed, operated, and maintained in accordance with the federal Department of Transportation's Minimum Federal Safety Standards in 49 CFR 192, which is the federal safety standard used in the transportation of natural gas.	
Land and Shoreline Use		
Issue 1	Description of Problem The FERC Final EIS does not include a summary of existing land use plans and policies applicable to the proposal, nor does it include a discussion of consistency with those plans and policies.	Ecology Requirement In the environmental review, include an analysis of the proposal's consistency with adopted land use and shoreline plans and regulations.
	Action The Draft Supplemental EIS (Section 3.7.2) includes an assessment of the consistency of the GSX-US project with adopted land use plans, policies, and regulations. A summary of the key elements of each plan, policy, or regulation is provided and is followed by an analysis of consistency with the proposal.	
Issue 2	Description of Problem The Final EIS does not include a discussion of measures to mitigate the permanent conversion of agricultural land to utility uses.	Ecology Requirement In the environmental review, include a discussion of measures to mitigate the permanent loss of agricultural land and an analysis of the proposal's impacts on agricultural crops.
	Action During construction, the GSX-US project would temporarily affect approximately 329 acres of agricultural land. Of that total, approximately 14 acres of hay meadow and pasture would be lost for the life of the project. In the GSX-Canada project, 28.2 acres of agricultural land will be at least temporarily affected by pipeline construction. No estimate is available for the number of acres of agricultural land that may be permanently lost (see Section 3.7.3).	
Socioeconomics		
Issue 1	Description of Problem The Final EIS does not provide references to support conclusions on population, economy, employment, housing, property values, and tax revenues.	Ecology Requirement In the environmental review, include proper documentation for all data and information obtained from other sources.
	Action The Draft Supplemental EIS (Section 3.8.2) includes a list of references originally contained in Resource Report 5, Socioeconomics, of Exhibit F-1 of GSX-US's original application to FERC.	

Table 1-1: Continued

Cultural and Historic Resources		
Issue 1	Description of Problem The eligibility status of prehistoric sites is not clear.	Ecology Requirement Clearly state the eligibility status of prehistoric sites in the environmental review and the steps to be taken to protect them from adverse impacts.
	Action Although the National Register status of prehistoric sites 45WH536, 45WH535, and 45WH534, and historic site 37-15 has not been resolved, GSX-US will treat the sites as if they are eligible for listing and will attempt to avoid the resources in the design phase. If avoidance is not feasible, GSX-US will consult with the Office of Archaeology and Historic Preservation (OAHP) and affected Indian tribes to determine the sites' significance and formulate treatment plans (see Section 3.9.2)	
Issue 2	Description of Problem The Final EIS states that a plan for unanticipated discovery has been submitted. However, no details on protocol have been provided.	Ecology Requirement Provide a summary of the plan for unanticipated discovery in the environmental review and specify that this would also be applicable for prehistoric and ethnohistoric properties.
	Action GSX-US prepared an Unanticipated Discovery Plan that was included in Resource Report 4, Cultural Resources, of Exhibit F-1 of GSX-US's original application to FERC. Although the plan was accepted by FERC, it has not been reviewed by OAHP and affected Indian tribes and incorporated into a Memorandum of Agreement. The Draft Supplemental EIS (Section 3.9.3) outlines the primary features of the Unanticipated Discovery Plan.	
Issue 3	Description of Problem The Final EIS does not adequately address the effects of changes to the pipeline route on cultural resources in the current right-of-way.	Ecology Requirement In the environmental review, include maps that show those portions of the route that have changed, and the status of archaeological surveys for those areas.
	Action The Draft Supplemental EIS (Section 3.9.4) summarizes the current status of cultural resource surveys, the results of prior surveys, and the status of previously identified archaeological sites in the project area.	
Issue 4	Description of Problem The Final EIS states that cultural resource testing was conducted without specifying the methodology.	Ecology Requirement Summarize the testing methodology in the environmental review.
	Action The Draft Supplemental EIS (Section 3.9.5) contains a summary of the methodologies used for cultural resource surveys.	
Issue 5	Description of Problem The Final EIS states that the OAHP considers a certain prehistoric site to be significant with the assertion, "that it is not well represented in the archaeological record" without any explanation of the site or its contents.	Ecology Requirement Clearly state the type of site and its features or artifact assemblage in the environmental review to clarify OAHP's assertion of significance.
	Action OAHP considers archaeological site 45WH536 to be significant. The site is a shallow scatter of prehistoric stone tools, bone artifacts, and fire-cracked rock. Few resources of this type have been recorded in interior western Washington (see Section 3.9.6).	

Table 1-1: Continued

Issue 6	Description of Problem The Final EIS cites five historic cultural resources without identifying eligibility status.	Ecology Requirement Include a determination of eligibility for the cultural resources in the environmental review.
	Action The Draft Supplemental EIS (Section 3.9.7) summarizes the eligibility status of the identified resources.	
Issue 7	Description of Problem The Final EIS did not adequately assess potential impacts on cultural/historic resources of project staging areas, temporary work areas, and access roads.	Ecology Requirement Evaluate all project staging and temporary work areas and access roads for potential impacts on cultural/historic resources.
	Action GSX-US surveyed access roads and staging areas as well as a 300-foot-wide corridor centered on the proposed pipeline's centerline. During the initial and one supplemental survey in 2000, 4.3 miles of the pipeline right-of-way was not surveyed because of landowner refusals. The results of additional archaeological survey since then have not been compiled. The results of these studies may identify additional resources in the project area (see Section 3.9.8)	
Traffic and Transportation		
Issue 1	Description of Problem The FERC Final EIS does not contain any meaningful analysis of traffic impacts.	Ecology Requirement Ecology's amended recommendation is that the Supplemental EIS include a limited analysis of traffic impacts associated with project construction.
	Action The Draft Supplemental EIS (Section 3.10.2) includes a brief analysis of potential impacts from construction traffic generated by the proposed project. It addresses construction workforce travel routes to and from job sites, the general effects of pipeline road crossings, and trips generated by construction vehicles and equipment. Although construction traffic generated by the GSX project alone is not expected to be significant, the potential exists for substantial cumulative impacts on traffic from simultaneous construction activity on the GSX project and the BP Cherry Point Cogeneration project in 2004 and 2005.	
Air Quality		
Issue 1	Description of Problem Because the air quality section of the Final EIS does not discuss wind patterns, it is not possible to determine if specific residential locations may be more susceptible to emissions than other locations.	Ecology Requirement In the environmental review, include an analysis and discussion of wind patterns for the project area and surrounding region.
	Action According to data from the National Oceanic and Atmospheric Administration monitoring program (1994-1999), the average wind speed over a six-year monitoring period was 9 mph. Over that six-year period, the month of January had the highest average wind speed of 9.7 mph and August had the lowest at 7.9 mph. Prevailing wind direction over the monitoring period was 190°. Wind roses from the Bellingham International Airport show a similar trend with the wind blowing from the south to north between the years of 1991-1995 (see Section 3.11.2).	

Table 1-1: Continued

Issue 2	Description of Problem The Final EIS does not include dispersion mapping in support of its claim of impacts below the Acceptable Source Impact Level.	Ecology Requirement Include dispersion mapping in the environmental review so that destination areas for project emissions may be identified.
	Action Each component (turbine, generator, dehydration unit, and boiler) of the Cherry Point compressor station was modeled and compared to the Prevention of Significant Deterioration (PSD) threshold of 250 tons per year (tpy). If results showed that the regulated pollutants were above the PSD threshold, further analysis would be necessary. However, results showed that each component of the compressor station was below the PSD major source threshold of 250 tpy. Therefore, the Cherry Point compressor station is not subject to the requirements of the PSD program, and no dispersion modeling is required (see Section 3.11.3).	
Noise		
Issue 1	Description of Problem The Final EIS is does not include an adequate description of noise abatement measures.	Ecology Requirement Clearly identify in the environmental review the proposed noise abatement measures for the project.
	Action Two additional studies were conducted for GSX-US to analyze noise generated by gas flow through the underwater pipeline. The results of the two studies, summarized in the Draft Supplemental EIS (Section 3.12.2), show that the proposed pipeline would not generate sounds of high enough frequencies and intensities to negatively affect marine life.	

2. DESCRIPTION OF PROPOSAL AND ALTERNATIVES

2.1 INTRODUCTION

2.1.1 Background

GSX-US proposes to construct and operate a natural gas pipeline from the Canadian border near Sumas, Washington, to the United States-Canada border at Boundary Pass in the Strait of Georgia. At the Boundary Pass border, the pipeline would connect with its Canadian counterpart (GSX-Canada) and continue on to Vancouver Island, British Columbia. Both pipelines are a joint undertaking of Williams Pipeline Company and BC Hydro.

The pipeline is a component of the proposed Vancouver Island Generation Project (VIGP), proposed by the Vancouver Island Energy Corporation (VIEC), a subsidiary of BC Hydro. VIEC proposes to construct a gas-fired power plant on Vancouver Island to supply the growing energy needs of island residents and businesses. That power plant would be supplied with gas from the GSX pipeline.

In March of 2003, VIEC applied to the British Columbia Utilities Commission (BCUC) for a Certificate of Public Convenience and Necessity to construct the VIGP. On September 8, 2003, the BCUC denied VIEC's application and recommended that BC Hydro proceed with a new analysis of alternatives to supply Vancouver Island's energy needs (BCUC 2003). At this time, the effects of the BCUC ruling on the GSX-US project are uncertain.

2.1.2 Current Project Alternatives

As lead agency, the Department of Ecology recommended analysis of the following alternatives for this Supplemental EIS:

- **Proposed Action** – The proposed action is the Georgia Strait Crossing (GSX-US) project. The GSX-US pipeline is part of a larger project jointly sponsored by BC Hydro and Williams Gas Pipeline Company. The GSX project calls for the design, construction, and operation of two interconnecting natural gas pipelines, one in Canada and one in the U.S. The pipelines will transport natural gas from Sumas, Washington, to Vancouver Island, British Columbia. Because it is an international project, the GSX pipeline has a U.S. component (GSX-US) and a Canadian component (GSX-Canada).
- **Terasen Gas Alternative –** Under this alternative, TGVI would undertake phased expansion of its current natural gas distribution system serving Vancouver Island. The Terasen Gas Alternative includes construction of up to three new compression stations, pipeline looping ("twinning") of 45.3 miles of existing pipeline, and construction of a LNG facility with a storage capacity of 1 Bcf.
- **No Action Alternative** – Under the No Action Alternative, the GSX pipeline would not be constructed. Without the proposed pipeline, other projects may assist in reducing the demand for natural gas on Vancouver Island. An example is a proposal by NorskeCanada. NorskeCanada proposes to install new electrical power cogeneration facilities at three of its mills, in combination with energy conservation and demand management.

2.1.3 Alternatives Considered in the FERC Final EIS

The FERC Final EIS discussed several system alternatives to the GSX proposal. System alternatives differ from alternative pipeline routes in that they make use of existing, modified, or planned pipeline systems to meet the stated objectives of the proposed project. A system alternative could make construction of all or part of the proposed project unnecessary. However, some modifications to an existing system may be required to increase its capacity or, conversely, an entirely new system may need to be constructed. Those alternatives, discussed in Chapter 4.0 of the FERC Final EIS, are summarized below.

Centra System Alternatives

Centra (now TGVI) had proposed two system alternatives that were discussed in the FERC Final EIS. The first alternative would have expanded the existing Centra system without a new marine crossing. Features included two new compressor stations, the upgrade of a third compressor station, and approximately 161 miles of pipeline "looping."

The second alternative would have expanded the existing Centra system with a new marine crossing of the Strait of Georgia between Sechelt and Harmac. Additional features included two new compressor stations, an 18.6-mile marine crossing of the Strait of Georgia, a 0.8-mile marine crossing of Northumberland Channel, approximately 63 miles of onshore looped pipeline, and approximately 10 miles of new onshore pipeline.

BC Gas System Alternative

BC Gas (now Terasen Gas) currently operates a natural gas distribution system in southern British Columbia. However, it does not currently provide natural gas to Vancouver Island. TGVI, a wholly owned subsidiary of Terasen Gas, provides natural gas service to Vancouver Island. GSX-Canada evaluated the expansion of the BC Gas system as an alternative to the proposed GSX-Canada project (Singleton Associated Engineering, Ltd. 2002).

New facilities that would be required as part of the BC Gas system expansion include a new compressor station, 11.7 miles of new onshore pipeline, 25.6 miles of marine offshore pipeline across the Strait of Georgia, 1.5 miles of onshore pipeline across Valdes Island, 7.1 miles of offshore pipeline across Stuart Channel, and 6.3 miles of onshore pipeline on Vancouver Island.

ARCO System Alternative

The existing ARCO pipeline is 18 inches in diameter and transports natural gas from Sumas to industrial facilities near Cherry Point. This alternative would use the ARCO pipeline for much of the onshore route. However, the system would need to be extended to allow deliveries to Vancouver Island. Therefore, to provide equivalent volumes of natural gas, the ARCO system would require expansion and construction of new facilities similar to those proposed for the GSX-US project.

Cascade System Alternative

The existing Cascade pipeline is parallel to much of the GSX-US onshore route. The Cascade pipeline is part of an existing distribution (versus transmission) system. Therefore, the pipeline would require significant modification and/or expansion to accommodate volumes equivalent to the GSX-US proposal. Like the ARCO system alternative, the Cascade pipeline would need to be extended to allow deliveries to Vancouver Island.

Orca System Alternative

In April 2000, Westcoast, Cascade, and Puget Sound Energy announced plans to study and evaluate the development of the Orca pipeline to transport natural gas from Sumas to Port Townsend, Washington. Two routes were considered. The first route would run along I-5 to Everett and then cross Puget Sound. The second alternative would run through Whatcom County, and then mostly offshore through San Juan County to Port Townsend.

The Orca system was not designed to transport natural gas to Vancouver Island. However, its proponents claimed the project could be modified to accommodate the volumes and delivery points proposed by GSX-US. In order to serve Vancouver Island, the Orca project would be more than 200 miles long, compared to the entire 84-mile-long GSX project. In September 2000, Orca announced that the project was put on hold because of a lack of firm commitment from potential major customers.

2.2 PROPOSED GSX PIPELINE

The GSX project consists of two integral parts. The GSX-US portion of the pipeline would transport natural gas from existing pipeline systems at the United States-Canada border near Sumas, Washington, to an interconnection with the GSX-Canada pipeline at Boundary Pass in the Strait of Georgia. The GSX-Canada portion of the pipeline would extend 37.2 miles (27.5 miles offshore and 9.7 miles onshore) from its interconnection with the GSX-US pipeline at Boundary Pass to an interconnection with an existing pipeline operated by Terasen Gas on Vancouver Island south of Duncan. The GSX-Canada project was the focus of an Environmental and Socio-Economic Assessment (ESEIA) that was part (Volume IV) of the application to the National Energy Board of Canada in April 2001. The proposed route of the GSX pipeline is shown in Figure 2-1.

2.2.1 GSX-US

On April 24, 2001, GSX-US filed an application with FERC to construct, install, own, operate, and maintain a new interstate natural gas pipeline and ancillary facilities in the state of Washington. GSX-US's proposed facilities were described in detail in Section 2.0 of FERC's EIS. On October 11, 2001, GSX-US amended its application to FERC to include several minor changes. That amendment included an adjustment of the location of the Cherry Point compressor station and three pipeline route variations—I-5 variation, Percie Road variation, and the Trillium variation. Those changes were examined as alternatives to the original proposed project and were described in detail in Sections 4.4 and 4.6 of the FERC EIS. GSX-US's proposed project (as

amended on October 11, 2001) was approved in the FERC's Order issuing a Certificate of Public Convenience and Necessity on September 20, 2002.

Pipeline Facilities

The GSX-US proposal calls for a pipeline to transport natural gas from existing pipeline systems at the United States-Canada border near Sumas, Washington, to an interconnection with a pipeline proposed by GSX-Canada at Boundary Pass in the Strait of Georgia. The system would consist of 47.3 miles of 20- and 16-inch-diameter pipeline.

The onshore portion of the pipeline would connect to the existing Westcoast and Northwest Pipeline systems at the international border at Sumas. From that point, a 20-inch-diameter pipeline would extend 32 miles to the Cherry Point compressor station. From the compressor station, a 16-inch pipeline would extend 1.1 miles to the beginning of the marine portion of the project at the Strait of Georgia shoreline.

The marine or offshore portion of the proposed route would be 13.9 miles long and constructed on a new right-of-way. The first 0.6 mile from the shoreline would be installed using the Horizontal Directional Drill (HDD) method to avoid disturbance of the shoreline in the Cherry Point State Aquatic Reserve. The next 4.8 miles of the pipeline would be installed in a trench so that the top of the pipe would be nearly level with the seafloor. The remaining 8.5 miles of the offshore portion of the pipeline would be laid directly on the seafloor.

Aboveground Facilities

For the onshore portion of the pipeline, aboveground facilities would include an interconnection facility, a compressor station, and mainline valves. The Sumas interconnection facility would be adjacent to Northwest Pipeline's existing Sumas compressor station. The Cherry Point compressor station would occupy a 12-acre site on Jackson Road near the BP Cherry Point Refinery. Mainline valves and associated permanent access roads would be installed along the pipeline route and would be located within the permanent right-of-way.

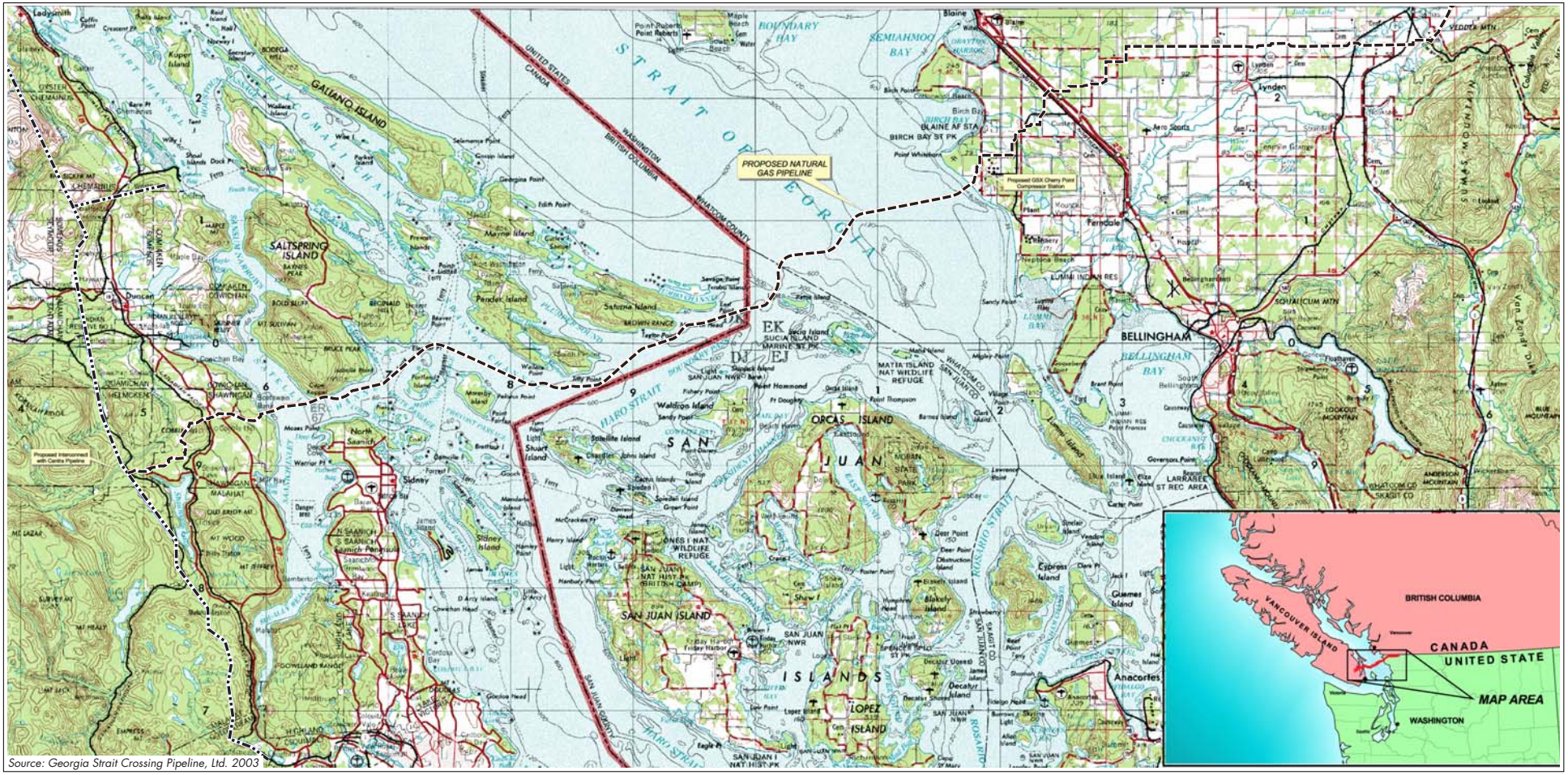
Route Modifications

GSX-US is proposing two minor modifications to the pipeline route that were not originally reviewed and approved by the FERC. These modifications include:

<u>Van Buren Road Reroute</u>

A 4,125-foot-long segment of the original pipeline route deviated from the existing Cascade and ARCO Pipeline rights-of-way near the crossing of Johnson Creek and Van Buren Road at milepost (MP) 6.1. Located about 700 feet north of the Cascade Pipeline right-of-way, the original route was farther away from several residences, presented more favorable topography at the HDD exit, and provided shorter construction access across Johnson Creek to the HDD entry location than a route following the existing pipeline right-of-way.

GraphicsSeaweedGraphicsBillableGSXFig2-1PipelineRoute 9.6.03



Source: Georgia Strait Crossing Pipeline, Ltd. 2003

0 5
Approximate Scale in Miles

existing Centra pipeline

proposed GSX pipeline

FIGURE 2-1

PIPELINE ROUTE

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Recent information gathered along the original route west of Van Buren Road indicates a natural spring is present at the HDD exit location that could be adversely affected. To avoid the spring, GSX-US considered lengthening the HDD to the west. However, the most suitable location for the HDD exit is near a nearby gravel pit. GSX-US determined that the likely success of the HDD would be reduced given the geological formation in this area. In order to cross Johnson Creek at a more favorable location, GSX-US is now proposing to continue the route along the Cascade and ARCO Pipeline rights-of-way. In addition to being fully collocated with existing pipeline rights-of-way and avoiding impacts on the spring, the proposed route variation would be more than 1,000 feet shorter than the originally proposed route.

Kickerville Road Reroute

The original pipeline route near MP 28.0 followed property lines and the existing ARCO pipeline right-of-way. Because of the presence of wetlands along the original route and current plans to develop the property as a wetland mitigation site, GSX-US is now proposing to deviate slightly from the ARCO right-of-way and to follow the Burlington Northern Railroad right-of-way. In addition to minimizing wetland impacts, the proposed route variation would be about 670 feet shorter than the originally proposed route. GSX-US currently owns the property that would be affected by the Kickerville Road reroute.

Project Construction

Section 2.3 of the FERC Final EIS contains a detailed description of the various construction methods that would be used to install the pipeline and related facilities. The HDD method would be used for installing the pipeline beneath the Cherry Point State Aquatic Reserve. GSX-US would assemble the pipe for the HDD at a pipe string launch site along Gulf Road. The site totals 23.6 acres, of which 8.6 acres would be the 50-foot-wide Gulf Road right-of-way. During use of this site, one lane of roadway south of Henry Road would be left open for traffic. If activities require complete closure of the road for short periods of time, the closures would be scheduled so that minimal impact on traffic would occur. The site-specific plan for launching the HDD pipe string from the Gulf Road site is shown in Figure 2-2.

2.2.2 GSX-Canada

Background

In April 2001, Georgia Strait Crossing Pipeline Limited (GSX-Canada) submitted an application to the National Energy Board of Canada (NEB) for a Certificate of Public Convenience and Necessity to construct and operate the Canadian portion of the GSX project. Action by the NEB on the GSX-Canada project is pending.

The application to the NEB included an ESEIA, which was prepared in accordance with the guidelines for filing requirements under Section 52 of the National Energy Board Act and the requirements of the Canadian Environmental Assessment Act. It examined the marine and terrestrial environmental settings and socioeconomic setting relevant to the pipeline project, identified the potential environmental and socioeconomic effects of the project, including cumulative effects, and assessed the significance and likelihood of any residual effects after

implementation of mitigation measures (GSX-Canada 2001). The discussion of environmental impacts of the GSX-Canada project contained in this Supplemental EIS is drawn primarily from that document.

Pipeline Facilities

The Canadian portion of the GSX project consists of 27.5 miles of marine pipeline and 9.7 miles of onshore pipeline. The project would commence at a point on the international border at Boundary Pass, approximately midway between the east end of Saturna Island (BC) and the west end of Patos Island (Wash., U.S.). It would terminate at a point on the Vancouver Island shoreline just north of Manley Creek (Figure 2-1).

The onshore segment of the project would commence at the Manley Creek landfall on Vancouver Island and end at an interconnection with the existing TGVI pipeline near Shawnigan Lake. This portion of the project would consist of 9.7 miles of 16-inch-diameter pipeline. The proposed GSX/Terasen interconnection would be adjacent to Terasen Gas's existing Shawnigan Lake meter station near the west end of Shawnigan Lake.

2.3 TERASEN GAS ALTERNATIVE

2.3.1 Background

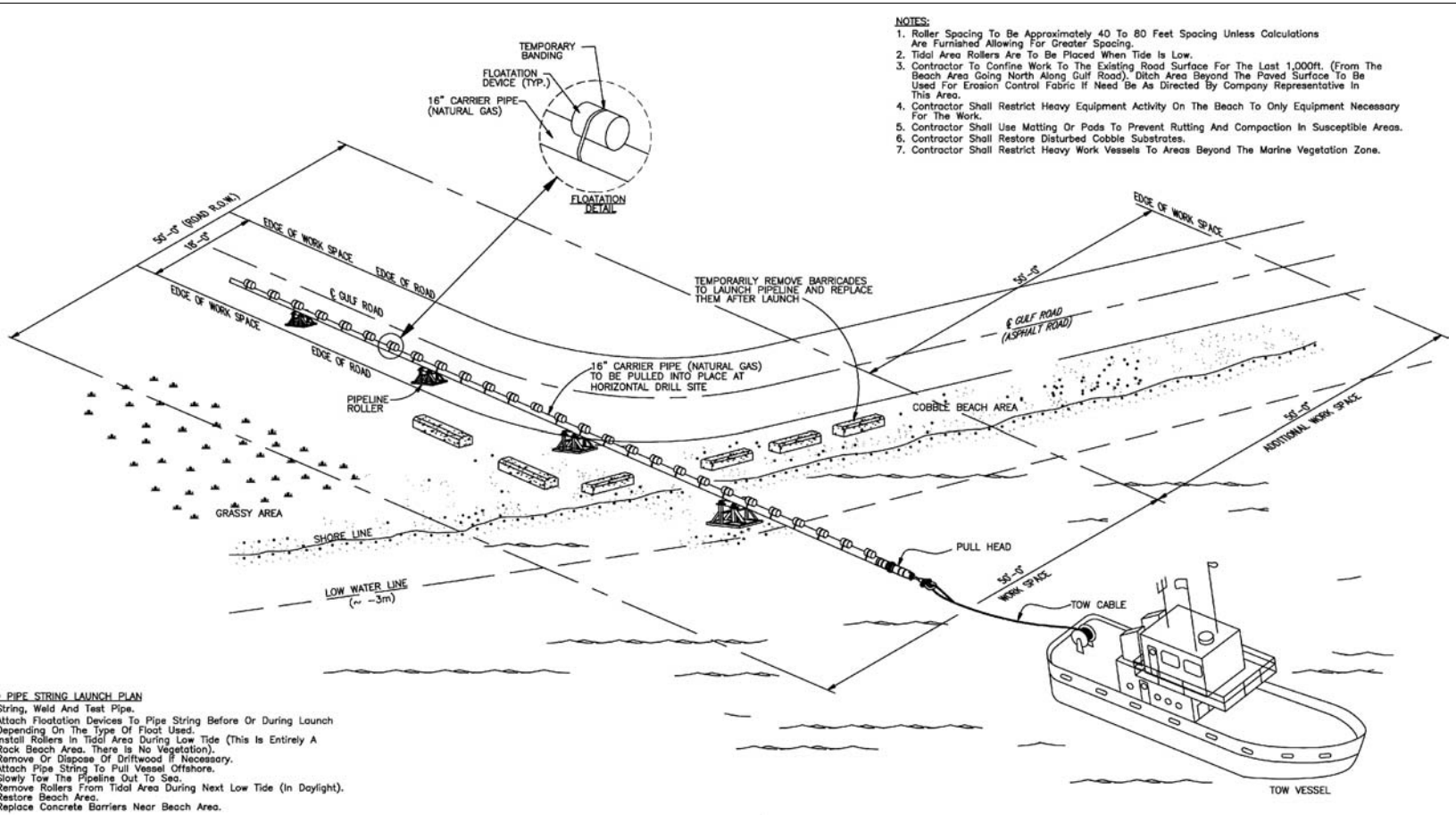
TGVI, formerly Centra Gas British Columbia, Inc., provides natural gas transmission and distribution services to more than 76,000 residential, commercial, and industrial customers on Vancouver Island and the Sunshine Coast. In response to VIEC's Application for a Certificate of Public Convenience and Necessity to build a new gas-fired generation facility on Vancouver Island that would be supplied by the GSX pipeline, TGVI developed a proposal for expansion of its current system through compression, pipeline looping, and addition of a liquefied natural gas storage facility. The proposal was submitted as evidence to the BCUC in May 2003 for a hearing on the VIEC proposal. In its proposal, TGVI contended that the proposed expansion of its facilities could defer or avoid the need for the GSX pipeline and be executed at a lower cost. TGVI requested the BCUC to direct BC Hydro to negotiate and enter into a long-term natural gas agreement with TGVI to serve the needs of Vancouver Island. At this writing, TGVI has not submitted an Application for a Certificate of Public Convenience and Necessity to implement its proposal.

2.3.2 Proposed Facilities

TGVI proposes a phased expansion program of upgrades to its system through compression and looping and the construction of an on-island LNG storage facility. The primary components of the program, shown in Figure 2-3, include:

- Expansion of the TGVI system through the addition of new compression facilities between 2005 and 2007.
- Looping of approximately 45.7 miles of existing pipeline.
- Construction of an on-island 1 Bcf LNG storage facility with liquefaction and vaporization facilities to be in service as early as November 2007.

Graphics Server\Graphics\Britable\GSI\Fig 2-2 Pipe Launch 9.6.03



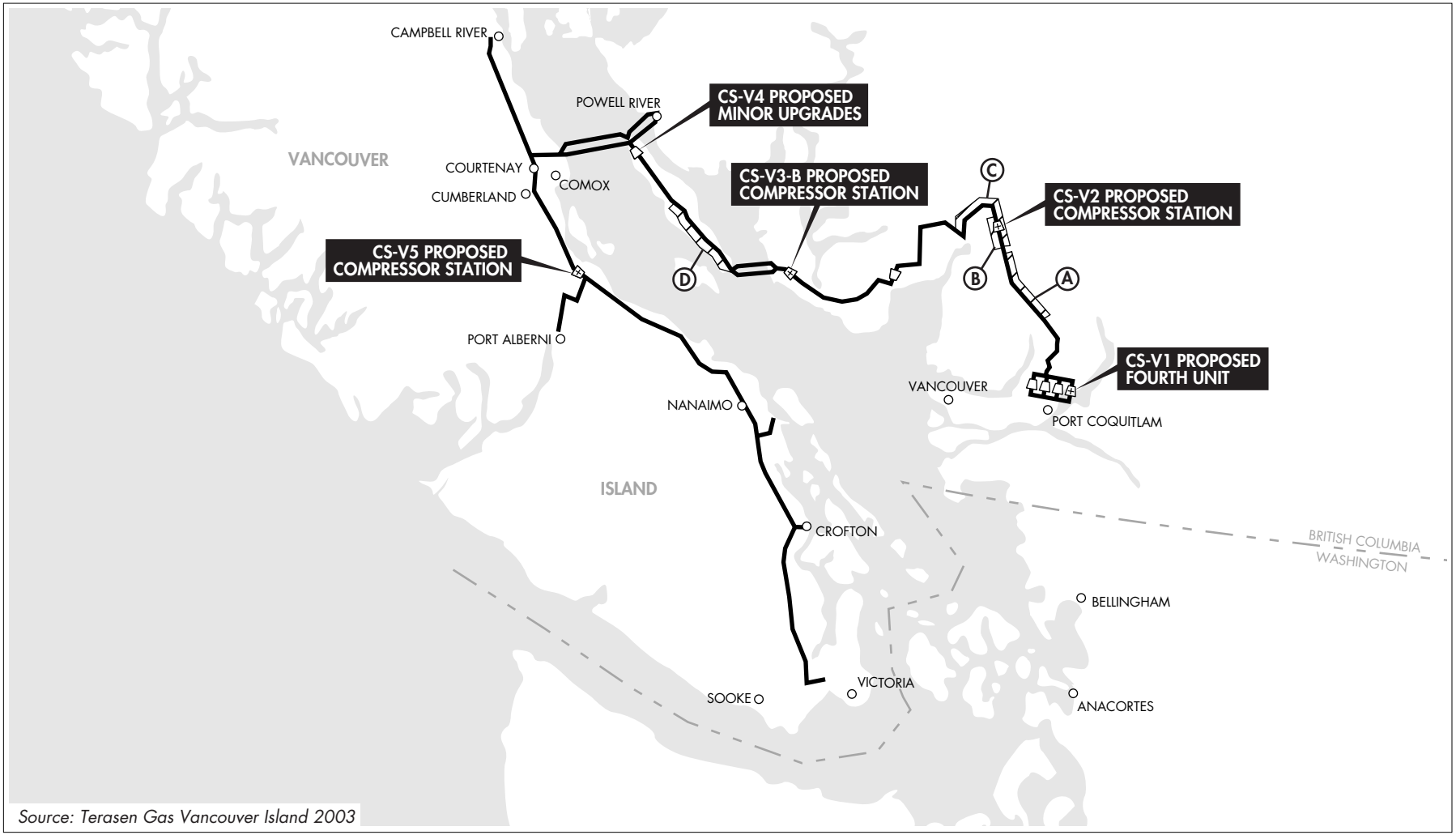
Source: Georgia Strait Crossing Pipeline, Ltd. 2003

NOT TO SCALE

FIGURE 2-2

HDD PIPE STRING LAUNCH PLAN

Graphics Server/Graphics/Billable/GSX/Fig 2-3 Terasen 9.16.03



0 30

Approximate Scale in Miles

pipeline

proposed looping

existing compressor unit

proposed compressor unit

(A) 15.5-mile loop

(B) 3.1-mile loop

(C) 10-mile loop

(D) 16.7-mile loop

FIGURE 2-3

TERASEN GAS SYSTEM PROPOSAL

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Compressor Stations

TGVI proposes the addition of up to three compressor stations alone or in conjunction with other facility additions: one station would be located upstream of the town of Squamish, one in Secret Cove on the Sunshine Coast, and the third at Dunsmuir on Vancouver Island. In addition, compression horsepower would be increased at TGVI's existing compressor stations at Coquitlam and Texada Island.

Pipeline Looping

Pipeline looping ("twinning") would be required on four segments of TGVI's existing pipeline. Those segments include:

- Watershed to Sky Pilot Creek (15.5 miles) is located on the mainland beginning where the existing pipeline emerges from the Greater Vancouver Water District watershed. This loop would parallel the existing pipeline through the Hixon Creek, Brandt Creek, Indian River, and Stawamus River valleys.
- Sky Pilot Creek to Squamish (3.1 miles) begins where the existing pipeline exits the narrow Stawamus Valley and enters the wider Squamish Valley.
- Sky Pilot Creek to Woodfibre (10 miles) traverses the Squamish River Valley by passing through Squamish, crossing the Squamish River, and climbing over the western valley wall to Woodfibre.
- Texada Island (16.7 miles) commences at the landing of the Secret Cove Marine pipelines and gradually climbs northwest along the center of Texada Island to the Texada Island block valve approximately halfway up the island.

LNG Facility

The TGVI proposal includes a 1 Bcf LNG facility to be located on Vancouver Island. The LNG facility would be connected directly to TGVI's existing transmission pipeline system. Operation of a LNG facility involves liquefaction of natural gas during periods of low demand, typically in warmer weather periods (up to 200 days of the year), followed by delivery during periods of high demand, typically during colder winter weather.

After it is purified, clean gas is sent to a refrigeration unit where the gas is condensed to its liquid state for storage. After liquefaction, the LNG is stored in a double-shell, insulated tank. A 1 Bcf tank would be approximately 150 feet in diameter and reach a height of approximately 150 feet.

Requirements for the operational area depend on the capacity of the operational facilities and equipment, as well as the topography of the site. For a level site, the operational area for a 1 Bcf LNG storage tank and associated facilities would be approximately 10 acres. A buffer zone would surround the operational area and separate the facility from adjoining properties and related public activities. This ensures a high level of public safety, regardless of changes to land use outside the buffer zone. The size of the buffer zone, as prescribed by Canadian regulations, is directly related to the design and capacity of the LNG storage tank and the design of the secondary containment area. With the buffer included, a minimum of 300 acres would be required for the site.

TGVI has undertaken initial siting studies for the LNG facility on Vancouver Island. More information on those preliminary studies is contained in TGVI's evidence submitted to the BCUC (Terasen Gas 2003).

2.4 NO ACTION ALTERNATIVE

Under the No Action Alternative, the GSX project (GSX-US and GSX-Canada) would not be constructed. The FERC EIS on the GSX-US project included a general discussion of alternatives that could be implemented under this scenario including energy conservation; use of alternatives fuels such as oil, wood, or coal; solar power; wave energy; and upgrading existing electric transmission cables serving Vancouver Island (FERC 2002). Since publication of the FERC Final EIS, other alternatives have been proposed that could help reduce the demand for natural gas on Vancouver Island if the GSX project is not constructed. One of these is the NorskeCanada Energy Project.

2.4.1 NorskeCanada Energy Project

Background

Norske Skog Canada Limited (NorskeCanada) owns three integrated pulp and paper mills on Vancouver Island at Crofton, Campbell River, and Port Alberni. A fourth mill is located at Powell River on the British Columbia mainland. For some time, NorskeCanada has been interested in taking advantage of power generation opportunities at its mill sites. In late 2001, it approached BC Hydro to identify opportunities for working together on major projects. NorskeCanada was not able to reach agreement with BC Hydro on any major projects or to agree on the economic requirements for a successful project.

Following the government's referral of the VIGP to the BCUC, and BC Hydro's application to the BCUC in March 2003, NorskeCanada has been working to complete the necessary engineering and economic analyses to support a proposal it believes would reduce demand for natural gas and produce energy at a lower cost than VIGP.

Proposed Facilities

NorskeCanada proposes to install new electrical power cogeneration facilities at its three Vancouver Island pulp and paper mills, together with energy conservation and demand management projects. The NorskeCanada Energy Project, with a total winter power capacity of approximately 364 megawatts (MW), is intended to meet power demand growth from other Vancouver Island electricity consumers and compensate for BC Hydro's declining transmission capacity from the BC mainland to Vancouver Island.

The NorskeCanada project calls for power generation and power demand reduction projects at NorskeCanada's three pulp and paper mills on Vancouver Island (Figure 2-4):

- Crofton Pulp and Paper Mill located near Duncan
- Port Alberni Paper Mill located in Port Alberni
- Elk Falls Pulp and Paper Mill located north of Campbell River

Graphics Server/Graphics/Billable/GSX/Fig 2-4 Mill Sites 9.15.03

0 60
Approximate Scale in Miles

CROFTON mill site

FIGURE 2-4

NORSKECANADA MILL SITES

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The primary components of the NorskeCanada proposal are turbine cogeneration, heat recovery, and demand management.

Gas and Steam Turbine Cogeneration

The new power generation facilities proposed for installation at the mills would be a combination of gas turbine and steam turbine cogeneration facilities integrated with the mill utilities. Cogenerated steam is produced by recovering heat from the gas turbine exhaust, and would replace steam currently produced in gas-fired boilers. The gas, formerly used in the gas-fired boilers to generate steam, would be used to generate both steam and power, resulting in more efficient use of the gas fuel. At the Crofton mill, a combination of gas and steam turbines would generate 107 MW. At Elk Falls, a combination of gas and steam turbines would generate 104 MW. At Port Alberni, a new gas turbine would generate 45 MW.

Heat Recovery

The second component of the NorskeCanada proposal would be a new thermomechanical pulp (TMP) facility to be installed at Elk Falls. TMP is a mechanical pulp produced by using large amounts of electrical energy in refiners that convert wood chips into pulp suitable for paper. The new TMP plant would result in reduced energy usage and increased steam production through an efficient heat recovery system. This steam would supplement the mill's existing steam system and allow for increased steam turbine power production.

Each TMP line would include a heat recovery system to collect steam from each of the refiners for reprocessing in a reboiler. The new lines would reduce the refining energy by 15 MW with no significant impact on pulp quality. The heat recovery systems would produce clean steam that could be used elsewhere in the mill. This will allow an additional 13 MW of power to be produced by the steam turbines in the mill. The combined net reduction of electrical power consumed by the TMP mill will be approximately 28 MW.

Demand Management

The new TMP facility would allow NorskeCanada to institute aggressive demand management. The increased TMP capacity would allow NorskeCanada to produce its daily requirement for tons of pulp by using periods of non-peak power demand on Vancouver Island and shutting down facilities during periods of peak power demand. Using this operating strategy, NorskeCanada would have the ability to free up significant power to the grid during peak power demand periods. For the purpose of this proposal, an operating scenario was developed that would allow transfer of 60 MW to the grid during peak demand periods. An additional 20 MW could be saved using load coordination among the three Vancouver Island mills.

3. AFFECTED ENVIRONMENT, SIGNIFICANT IMPACTS, AND MITIGATION MEASURES

3.1 INTRODUCTION

3.1.1 Ecology Review

In December of 2002, the Washington Department of Ecology initiated a process to evaluate the suitability of the project's NEPA Final EIS in meeting the environmental review requirements under SEPA. To determine whether the project's existing NEPA EIS could be adopted to meet the requirements of SEPA, Ecology was required to conduct an independent review of the NEPA document.

As a result of that process, Ecology determined that 39 issues in the NEPA Final EIS were not adequately addressed to satisfy SEPA requirements. The list transmitted to GSX-US by Ecology on July 28, 2003, reflected the issues that would need to be addressed in a Supplemental EIS.

For this Supplemental EIS, each of the 39 issues is assigned to a corresponding topic or element of the environment under SEPA. Those issues provide the framework for the environmental analyses in the Supplemental EIS. The topic areas are:

- Project Description (addressed in Chapter 2)
- Geology and Soils
- Surface Water
- Groundwater
- Plants and Animals
- Reliability and Safety
- Land and Shoreline Use
- Socioeconomic Conditions
- Cultural and Historic Resources
- Traffic and Transportation
- Air Quality
- Noise

3.1.2 Chapter Organization

Each section of this chapter on affected environment, significant impacts, and mitigation measures is organized in the following manner:

Element of the Environment

The first title that appears at the beginning of each section identifies the element of the environment for which issues have been identified by Ecology for response.

Applicable Sections in FERC Documents

This section lists references to all applicable sections of the FERC Final EIS and supporting documents where the reader may review the original analyses. It also refers the reader to applicable sections of the Environmental Report that accompanied GSX-US's original application to FERC.

Issue Summary

This includes a summary of the issue, followed by Ecology's requirement for how the issue must be addressed in this Supplemental EIS.

Affected Environment

If Ecology's recommendation calls for additional information on existing conditions, that information will be included in this section. Depending on the scope of the response, this section may also include information for the GSX-Canada portion of the project. If Ecology's recommendation does not call for additional information on the affected environment, this section will state, "No additional analysis required."

Impacts

If Ecology's recommendation calls for additional analysis or clarification of potential impacts, that information will be included in this section. Depending on the scope of the response, this section may also include information for the GSX-Canada portion of the project, the Terasen Gas Alternative, and the No Action Alternative. If Ecology's recommendation does not call for additional information on potential environmental impacts, this section will state, "No additional analysis required."

Mitigation Measures

If Ecology's recommendation calls for additional information on measures to mitigate potential environmental impacts, that information will be included in this section. Depending on the scope of the response, this section may also include information for the GSX-Canada portion of the project, the Terasen Gas Alternative, and the No Action Alternative. If Ecology's recommendation does not call for additional information on mitigation measures, this section will state, "No additional analysis required."

Significant Unavoidable Adverse Impacts

If Ecology's recommendation calls for additional analysis or clarification of environmental impacts that could be significant, unavoidable, and adverse as defined under SEPA, that information will be included in this section. Depending on the scope of the response, this section may also include information for the GSX-Canada portion of the project, the Terasen Gas Alternative, and the No Action Alternative. If Ecology's recommendation does not call for additional information on significant, unavoidable, adverse impacts, this section will state, "No additional analysis required."

3.2 GEOLOGY AND SOILS

3.2.1 Applicable Sections in FERC Documents

Please refer to Section 3.1 in the FERC Final EIS and Resource Report 6, Geological Resources, in Exhibit F-1 of GSX-US's original application to FERC.

3.2.2 Issue 1

Issue Summary

Description of Problem

The Final EIS states that the U.S. onshore pipeline route does not cross any potentially active faults. Easterbrook et al. (2000), which is cited in the EIS, documents activity along both the Sumas and Vedder Mountain faults since 1964, which indicates these faults are currently active. The cited reference also delineates the location of these faults more clearly than in Figure 3.1.2-1 of the Final EIS.

Further, the Final EIS states that earthquakes could result in soil liquefaction along certain segments of the route. No mention is made of potential displacements from potentially active faults such as the Sumas and Vedder Mountain faults.

Ecology Requirement

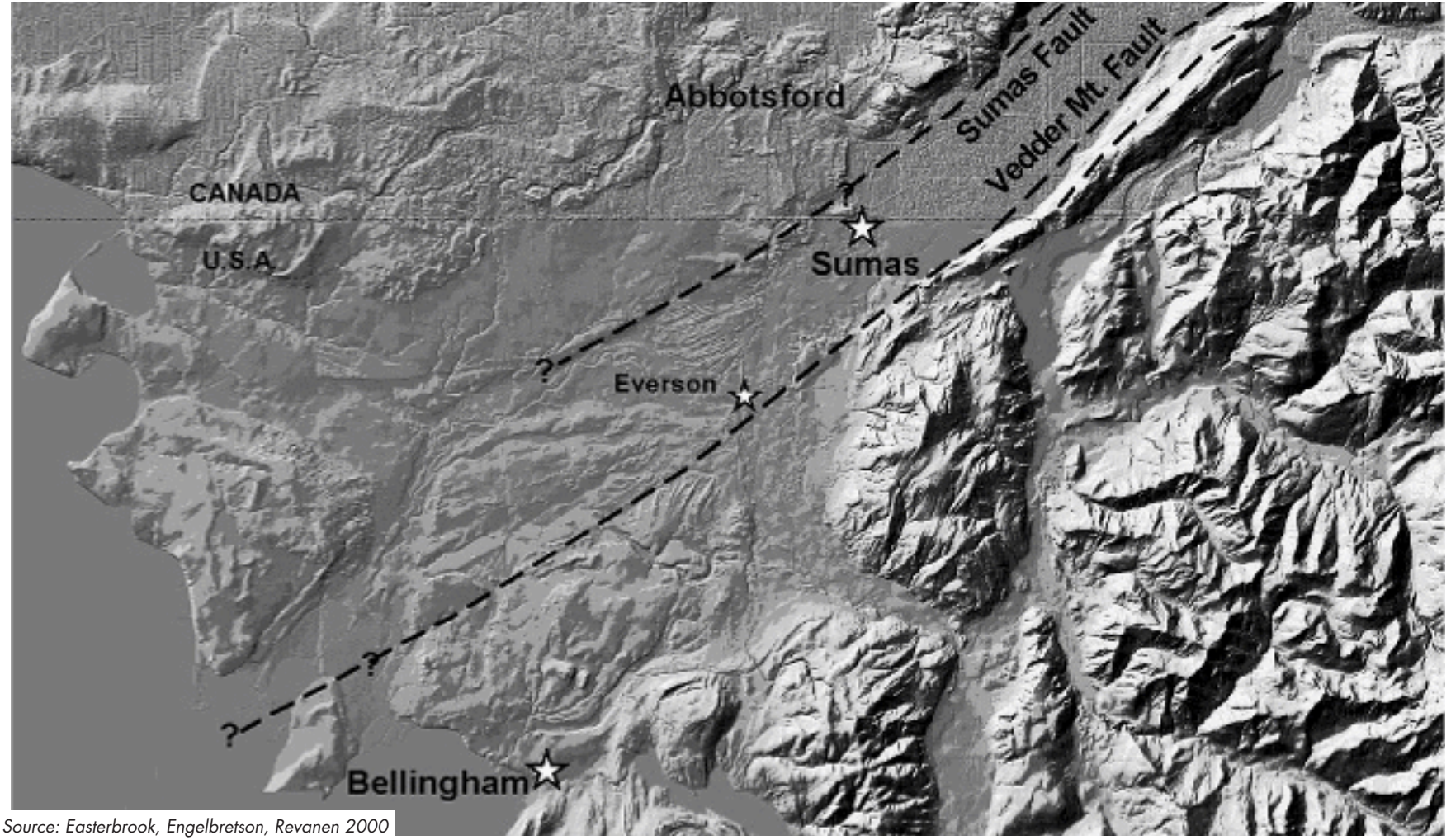
Include an additional figure identifying these potentially active faults in relation to the proposed pipeline route in the environmental review. In pipeline engineering and construction, accommodate the increased potential for fault movements in these areas. Include a discussion of environmental impacts resulting from potential pipeline rupture and mitigation measures.

Affected Environment

Figure 3.2-1 shows the projected locations of the Vedder and Sumas Mountain faults in relation to the pipeline alignment. The projected Vedder Mountain Fault is approximately 1 mile east of, and parallel to, the proposed pipeline alignment. The projected Sumas Fault crosses the proposed pipeline route somewhere between Milepost 5 and Milepost 8.

Relative to the pipeline route, both seismic acceleration and seismic velocity predictions reach peak values in the eastern reaches of the Gulf Islands. Most of the identified potentially active faults also lie within the Gulf Islands, south of Pender and Saturna islands, between MP 10.4 and MP 27.3. One of the most prominent fault zones in the area occurs within U.S. waters between MP 10.4 and 11.0, and one other possible feature was identified in the southern Strait of Georgia at MP 5.7 (GSX-Canada 2001).

Graphics Server/Graphics/Billable/GSX/Fig 3.2-1 Project area faults 9.15.03



Source: Easterbrook, Engelbretson, Revanen 2000

0 6
Approximate Scale in Miles

FIGURE 3.2-1

PROJECT AREA FAULTS

GEORGIA STRAIT CROSSING PROJECT

SHAPIRO & ASSOCIATES, INC.

1034001

Impacts

GSX-US

Potential impacts associated with liquefaction would be the same as the GSX-Canada project, described below.

GSX-Canada

The Pacific Northwest, which includes the pipeline route, is an area of high seismic activity. This activity, as manifest by earthquakes, can result in ground vibration, tsunamis, ground upheaval, marine and terrestrial landslides, and soil liquefaction. Liquefaction potential is low to moderate for the terrestrial segment of the proposed route. The areas along the pipeline route that are susceptible to seismic liquefaction coincide with those areas where a high groundwater level will cause buoyant uplift.

Moderate to large earthquakes are known to have resulted in a variety of underwater landslides and coastal liquefaction phenomena. All of these events have potential to increase risk of pipeline rupture, the degree of risk being dependent on the magnitude of the event, the characteristics of the pipeline route, and the pipeline design specifications. In the event of a line break, most gas would bubble to the surface and escape to the atmosphere. Pressure-sensitive shut-off valves on both shores could be remotely or locally operated to isolate the ruptured marine segment. The volume of confined gas would escape to a point where it equalized with external pressure. Some bottom scour could occur near the leak or line break depending on the direction it faced. Temporary, localized disturbance of benthic flora and fauna would occur (GSX-Canada 2001).

Terasen Gas Alternative

No seismic analysis is available for the Terasen Gas Alternative.

No Action Alternative

Impacts of the proposed project would not occur.

Mitigation Measures

Proposed Action

No additional analysis required.

Terasen Gas Alternative

No additional analysis required.

No Action Alternative

Impacts of the proposed project would not occur.

Significant Unavoidable Adverse Impacts

No additional analysis required.

3.2.3 Issue 2

Issue Summary

Description of Problem

Final EIS Section 3.2 does not adequately respond to Ecology's Draft EIS comment requesting the name and location of waterbodies with potential scour impacts.

Ecology Requirement

Discuss locations of waterbodies with potential scour impacts in the environmental review.

Affected Environment

No additional analysis required.

Impacts

GSX-US

Sediments composing the substrate below active stream channels are susceptible to scour during flood conditions. The potential for stream scour depends largely on flood flow characteristics and the grain size of bottom sediments. Stream scour could expose a pipeline that is underneath a stream if scour depths exceed pipe burial depths.

GSX-US used a 100-year flood as the basis for estimating the depth of bottom scour for the streams crossed by the pipeline. Depending on depth of channel and the size of the waterbody, GSX-US placed all of the waterbodies into one of two categories. The first category includes waterbodies where most of the water during a 100-year flood would not be contained within the confines of the immediate channel. The second category includes larger and deeper waterbodies where the water during a 100-year flood would be contained within the confines of the immediate channel with only limited overbank flooding.

For the smaller waterbodies in the first category, the surface area of flooding during a 100-year return flood would generally be over the bank and widespread. In these cases, the velocity of flow would be below the threshold to produce significant bottom scour except for those waterbodies with loose sand and silt channel substrate. For the waterbodies in the first category,

GSX-US conservatively estimates that the depth of scour would be equal to or less than the height of the channel. Estimated scour depths during a 100-year return flood for the waterbodies in the first category generally range from 3 to 5 feet.

A 100-year flood in waterbodies in the second category would generally result in higher water velocities and potentially greater levels of scour. To estimate scour depths for these waterbodies, GSX-US used accepted stream hydrology analytical techniques and an empirical rule relating to scour depth suggested by Terzaghi (1936). This assessment required various drainage basin parameters and stream flow discharge information. The drainage basin parameters, including stream channel gradients, widths, normal depths of flow, and bank heights for streams crossed by the project, were obtained from topographic maps, field observations, and Ecology's Web site (Williams Pipeline Company 2003).

GSX-Canada

The potential impacts associated with stream scour and the methods for assessment would be the same as the GSX-US project.

Terasen Gas Alternative

No analyses of stream scour are available for the Terasen Gas Alternative.

No Action Alternative

Impacts of the proposed project would not occur.

Mitigation Measures

Proposed Action

No additional analysis required.

Terasen Gas Alternative

No additional analysis required.

No Action Alternative

Impacts of the proposed project would not occur.

Significant Unavoidable Adverse Impacts

No additional analysis required.

3.3 SURFACE WATER

3.3.1 Applicable Sections in FERC Documents

Please refer to Section 3.1 in the FERC Final EIS and Resource Report 2, Water Use and Quality, in Exhibit F-1 of GSX-US's original application to FERC.

3.3.2 Issue 1

Issue Summary

Description of Problem

The discussion of existing conditions for surface water quality in the Final EIS is three sentences, while the marine water quality discussion is almost two pages. The existing condition of surface waterbodies is at least as important as marine waters. At a minimum, the nine waterbodies listed as impaired under 303(d) should be identified along with their problems.

Ecology Requirement

Include an expanded discussion of existing surface water conditions to allow a reasonable assessment of potential impacts in the environmental review.

Affected Environment

No additional analysis required.

Impacts

Proposed Action

FERC's Resource Report 2, Water Use and Quality, indicates the GSX project will cross nine waterbodies that are considered impaired under Section 303(d) of the Clean Water Act: Sumas River, Johnson Creek, Squaw Creek, Fishtrap Creek, Bender Creek, Bertrand Creek, South Fork Dakota Creek, tributary to South Fork Dakota Creek at MP 22.17, and California Creek. This report was based on a 1998 list from Ecology's Web site. In 2002, however, Ecology developed a map of the 303(d) reaches for each affected stream in Water Resource Inventory Area (WRIA) 1; this map is available at http://www.ecy.wa.gov/services/gis/maps/wria/303d/w1a-303d.pdf. When the GSX project pipeline route is overlaid on this map, it appears only six 303(d) stream reaches will be encountered, as listed in Table 3.3-1.

The GSX project route would cross the Sumas River and Bertrand Creek at considerable distances upstream from the contaminated section shown on the WRIA 1 map, and between two contaminated reaches of the South Fork Dakota Creek. Two streams (tributary to South Fork Dakota Creek at MP 22.17 and California Creek) that were reported in Resource Report 2 to contain contaminated sediments apparently do not. However, the WRIA 1 map shows that two

streams (tributary to Johnson Creek at MP 5.5 and Double Ditch Creek) that were not included in the FERC Resource Report contain contaminated sediments at the GSX project crossings.

Of the six waterbodies listed above, three (Johnson Creek, Fishtrap Creek, and Double Ditch Creek) will be crossed using HDD or conventional bore trenchless techniques, thereby avoiding possible resuspension of contaminated sediments. Three streams will be crossed using open-cut methods: a tributary to Johnson Creek at MP 5.5, Squaw Creek, and Bender Creek. GSX-US proposes to cross the tributary to Johnson Creek at MP 5.5 with the open cut, wet ditch technique and Squaw and Bender creeks with the open-cut, flume technique. There is a potential for limited sediment resuspension by the open cut techniques, but because all three streams at these crossings are channelized, the amount of pre-construction sediment deposition would be low. In addition, the flume crossing technique will affect a very short reach of stream. The sandbag dams across the stream at each end of the flume will retain turbidity between the dams until the dams are removed. GSX-US proposes to further minimize the amount of resuspended sediment by installing clean gravel in the upper 1 foot of trench backfill in the streambed and by placing erosion-control fabric on the reconstructed streambanks.

If the trenchless crossing technique fails at any of the streams at which it is proposed, the streams would have to be crossed with open-cut techniques. In that case, the potential for sediment resuspension would be similar to that for the streams discussed above.

Table 3.3-1 summarizes the information regarding the 303(d) impairment for the six crossings.

Table 3.3-1: 303(d) Stream Crossings

Milepost	Waterbody	303(d) Listing Stream Reach and Impairment	Crossing Method
5.50	Tributary to Johnson Creek (Clearbrook Creek)	CT99ZQ Fecal coliform, dissolved O_2	open-cut, wet ditch
6.19	Johnson Creek	PL 43AX Fecal coliform, dissolved O_2	horizontal directional drill
8.24	Squaw Creek	GF74PM Fecal coliform	open-cut, flume
11.32	Fishtrap Creek	RN53NC Fecal coliform	conventional bore
11.86	Bender Creek	UI16IQ Fecal coliform	open-cut, flume
13.39	Double Ditch Creek	LN43IE Fecal coliform, ammonia-N	conventional bore

Source: Ecology 2003.

Terasen Gas Alternative

There is no assessment of potential stream crossings for the Terasen Gas Alternative.

No Action Alternative

There is no assessment of potential stream crossings for the NorskeCanada proposal.

Mitigation Measures

Proposed Action

No additional analysis required.

Terasen Gas Alternative

No additional analysis required.

No Action Alternative

No additional analysis required.

Significant Unavoidable Adverse Impacts

Assuming specialized construction techniques are used and Ecology's recommended mitigation measures are incorporated, significant adverse impacts are unlikely.

3.3.3 Issue 2

Issue Summary

Description of Problem

The discussion of construction impacts in the Final EIS does not include dewatering, or water drainage, impacts. Dewatering operations could affect both surface water quantity and quality. For example, the conventional boring method for stream crossings will likely have to be accompanied by significant dewatering of the surrounding aquifer. The large pumping rates could present problems for controlling discharge water and dewatering, or severely reducing stream flow at that location and downstream.

Ecology Requirement

Include a more thorough analysis and discussion of the potential effects of dewatering activities on surface water and groundwater in the environmental review, including impacts on stream flows.

Affected Environment

No additional analysis required.

Impacts

Proposed Action

Water would be pumped out of the trench and discharged to the ground in a manner that does not cause erosion or allow unfiltered flow into wetlands, streams, or lakes. To achieve this, water pumped out of the trench would be discharged to a well-vegetated upland site through a temporary dewatering structure such as hay bales or a filter bag. Water would not be pumped directly to surface waters. Dewatering would never exceed 10% of the receiving water volume (Williams Pipeline Company 2003).

Terasen Gas Alternative

There is no assessment of potential dewatering impacts for the Terasen Gas Alternative.

No Action Alternative

There is no assessment of potential dewatering impacts for the NorskeCanada proposal.

Mitigation Measures

Proposed Action

No additional analysis required.

Terasen Gas Alternative

There is no assessment of potential dewatering impacts for the Terasen Gas Alternative.

No Action Alternative

There is no assessment of potential dewatering impacts for the NorskeCanada proposal.

Significant Unavoidable Adverse Impacts

No additional analysis required.

3.3.4 Issue 3

Issue Summary

Description of Problem

Recommendations regarding the open cut method as a crossing alternative are not discussed in the contingency plan.

Ecology Requirement

If the proposed action alternative is approved, there will be substantial pressure from GSX-US to quickly approve the decision for the open-cut method. Have the contingency plan in place before construction begins, and describe it in the environmental review.

Affected Environment

GSX-US prepared "Request No. P1," dated May 7, 2003, which eliminates the option for an open cut at Cherry Point. The request cites reports by two geotechnical engineering companies and bids from five drilling firms, which conclude the HDD method has a probability of success of almost 100%. GSX-US states that the contingency or alternative to the proposed HDD method is additional attempts at the HDD. The Applicant also acknowledges that in a May 22, 2003, meeting with representatives from Ecology, Whatcom County, and the Corps, it was formalized that an open cut, even if proposed, was not permittable.

The issues relating to an open-cut method are substantial, and include impacts on hydrology, vegetation, geology, wildlife, intertidal habitat (including local herring habitat), beach habitat, and visual impacts. Therefore, an open cut is not considered a viable alternative to the HDD.

Impacts

GSX-US

GSX-US is not requesting approval for an open cut for the marine entry because the HDD method is the one that will be used to install the pipeline near Cherry Point, Washington. Based on its own extensive studies, GSX-US has concluded that the HDD shore approach at Cherry Point is achievable with nearly 100% probability of success and is the primary and preferred method for the GSX pipeline shore crossing.

The contingency or alternative to the proposed HDD is additional attempts at the HDD. In the unlikely event that a first attempt would fail, after an analysis to determine the details of the failure and to make revisions as necessary to mitigate the failure possibilities, a second HDD attempt would be made. If the second attempt were to fail, after additional analysis to determine the details of the second failure and to make additional revisions as necessary to mitigate the failure possibilities, a third attempt would be made. The probability of success of one of the three attempts is almost guaranteed. Additional engineering analysis and HDD attempts would be completed as necessary to install the GSX-US pipeline at the shoreline.

GSX-Canada

Potential marine environmental effects associated with the HDD for the GSX-Canada project primarily relate to the permanent loss or temporary disturbance of eelgrass habitat. The major impact area would be near the HDD exit hole where suspended sediment and bentonite drilling muds could be transported to nearby eelgrass. Sustained high suspended sediment levels could impair ecological function. Concerns were also expressed about potential effects on nearshore

habitat from vessel operation and anchoring. In addition to suspended sediment, concerns were expressed about the potential toxicity of the drilling mud and the viscosifer agent to be used at the HDD exit hole.

If the Vancouver Island shoreline crossing cannot be accomplished using HDD, a partial HDD or full open-cut method would be used. These methods would raise many of the environmental issues the HDD is intended to avoid. The partial HDD and the full open cut would require excavation through the aquatic shoreline area including shallow subtidal and intertidal zones.

For a full open cut, forest cover on the slope would be cleared from the right-of-way (ROW) and a dragline or equivalent excavator would be used to dig the trench. Without intensive bank stabilization and reclamation effort following full open-cut construction, there could be chronic erosion and increased aquatic shoreline siltation and turbidity. This outcome would result in proportionately more long-term effects on marine vegetation (National Energy Board 2003).

Terasen Gas Alternative

Looping of the existing Terasen Gas pipeline will involve crossing a number of small streams and two major rivers: the Indian River and Squamish River. The two river crossings will be accomplished with directional drilling, the technique used to install the current pipeline in 1989. Potential impacts associated with these crossings are expected to be similar to those for the GSX-US and GSX-Canada projects. However, the Terasen Gas proposal does not call for the crossing of any marine shoreline (Terasen Gas 2003).

No Action Alternative

The NorskeCanada proposal does not call for pipeline construction.

Mitigation Measures

GSX-US

Because a partial or full open cut is not proposed at Cherry Point, a contingency mitigation plan has not been proposed.

GSX-Canada

In the event of a failed HDD, the Joint Review Panel accepted the reclamation and restoration measures outlined in GSX-Canada's contingency plan for a partial HDD or open cut. However, to ensure potential effects are managed during construction, the panel recommended that GSX-Canada not proceed with the partial HDD or open-cut method without developing a detailed site-specific crossing plan and an eelgrass monitoring plan that receives approval from the National Energy Board. The panel concluded that, with the implementation of GSX-Canada's proposed mitigation measures and the panel's recommendation, significant adverse environmental effects of a partial HDD or open cut would be unlikely (National Energy Board 2003).

Terasen Gas Alternative

Terasen Gas's existing pipeline corridor was chosen in 1989 on the basis of geotechnical, environmental, land use, and property ownership considerations consistent with current route selection techniques. Geotechnical considerations were particularly important in the selection of the original route. These considerations included topography, surficial geology, surface and subsurface drainage, and slope stability. The selection of the best route from a geotechnical standpoint was important to minimize erosion and sedimentation problems. The original crossing of the Squamish River, considered to be the most environmentally sensitive crossing, successfully used the directional drilling technique. The results of Terasen Gas's original studies and construction techniques would be applied to the proposed pipeline loops.

No Action Alternative

The NorskeCanada proposal does not call for pipeline construction.

Significant Unavoidable Adverse Impacts

No additional analysis required.

3.3.5 Issue 4

Issue Summary

Description of Problem

The Final EIS does not elaborate on or evaluate criteria for wet ditch versus dry ditch excavation. Rather, it indicates that this would occur at some future time "prior to construction." High flow volumes are identified as one of the conditions where wet ditch excavation may be required. These are also the conditions that would have the highest potential for water quality impacts. Criteria for decisions and the potential impacts of these decisions need to be addressed in more detail and cross-referenced to the evaluation of fisheries impacts.

Ecology Requirement

Discuss the criteria to be used for selecting the wet ditch method in the environmental review and expand discussion of the impacts of that approach.

Affected Environment

No additional analysis required.

Impacts

Proposed Action

The wet ditch method or "open cut, flowing" technique installs the pipe while stream flow is maintained in the channel. Prior to trench excavation in the waterbody, the pipe string is fabricated in an upland area and all materials are staged. A temporary bridge is installed to allow workers and equipment to cross the channel. Erosion-control measures are installed to prevent siltation of the stream from soil stockpiles and construction activities outside the streambank.

Excavation is accomplished using conventional hydraulic excavation equipment. The trench is excavated on both sides of the stream, leaving "plugs" or hard soil in place to prevent the stream from entering the excavation. At this point, instream excavation begins, using one or two pieces of excavating equipment depending on the width of the stream; excavation in very narrow streams will be completed using one trackhoe. Excavated spoils will be stockpiled at least 10 feet from the stream and protected with erosion-control devices to prevent silt-laden water from entering the stream. Pipe is then placed into the trench and backfilling begins. Backfilling begins in the center of the trench and moves outward to the banks. This method forces silt-laden water to the ditch outside the stream channel; however, some silting of the stream will naturally occur (Williams Pipeline Company 2003).

GSX-US will use native materials to backfill instream ditches. Clean, washed gravel will overlay disturbed native material in fish-bearing and 303(d)-listed streams.

Terasen Gas Alternative

There is no assessment of potential crossing methods for the Terasen Gas Alternative.

No Action Alternative

No additional analysis required.

Mitigation Measures

Proposed Action

Ecology has recommended the use of clean gravel in the upper 12 inches of backfill to stabilize the trench and reduce sedimentation. This recommendation has been incorporated into the Wetland and Riparian Restoration Plan for fish-bearing and 303(d)-listed streams.

Terasen Gas Alternative

No additional analysis required.

No Action Alternative

No additional analysis required.

Significant Unavoidable Adverse Impacts

Assuming proposed construction techniques are used and Ecology's recommended mitigation measures are incorporated, significant adverse impacts are unlikely.

3.3.6 Issue 5

Issue Summary

Description of Problem

The Final EIS does not adequately discuss the potentially significant adverse impacts of operating or driving clearing equipment through perennial waterbodies. Modern technology for temporary bridges makes driving equipment through waterbodies almost completely unnecessary. A recommendation to avoid is not sufficient to protect water quality or fisheries resources.

Ecology Requirement

Where no bridge exists, construction of a bridge would result in vegetation clearing at a minimum and could result in in-water work. Impacts associated with these crossings need to be identified and mitigation proposed for those impacts.

Affected Environment

No additional analysis required.

Impacts

Proposed Action

FERC Environmental Condition No. 14 prohibits equipment crossing through perennial waterbodies unless otherwise approved by FERC in the Implementation Plan. GSX-US will not propose equipment crossing (fording) through perennial streams. GSX-US has revised its Wetland and Waterbody Crossing Procedures to state that clearing crews shall avoid fording perennial streams. All stream crossings will use portable bridges, which are narrow enough to allow bridge installation from one side without fording the stream. No in-water work will be necessary for portable bridge installation. Impacts on riparian areas and proposed mitigation are presented the draft Wetland and Riparian Restoration Plan (GSX-US 2003).

Terasen Gas Alternative

There is no assessment of operating or driving clearing equipment through perennial waterbodies for the Terasen Gas Alternative.

No Action Alternative

The NorskeCanada proposal does not involve pipeline construction.

Mitigation Measures

Proposed Action

No additional analysis required.

Terasen Gas Alternative

No additional analysis required.

No Action Alternative

No additional analysis required.

Significant Unavoidable Adverse Impacts

No additional analysis required.

3.3.7 Issue 6

Issue Summary

Description of Problem

The Final EIS does not provide justification for why open cut crossings of 303(d)-impaired waterbodies would not have an adverse effect. Discussion states that, "we do not believe that using the open-cut crossing methods would increase the water bodies' impairment," but no justification is provided for this statement.

Ecology Requirement

Provide supporting documentation for the conclusion that open-cut crossings would have no adverse impacts in the environmental review.

Affected Environment

No additional analysis required.

Impacts

Proposed Action

The GSX project crosses six waterbodies that are listed on the 303(d) as impaired (see Table 3.3-1). Of the six waterbodies listed, three would be crossed using HDD or conventional bore trenchless techniques to avoid possible resuspension of contaminated sediments. The other three streams would be crossed by open-cut methods. GSX-US proposes to cross the tributary to Johnson Creek at MP 5.5 with the open cut, wet ditch technique, and Squaw and Bender creeks with the open-cut, flume technique, which is described in detail below.

The decision to install the pipe using the open-cut method would only be made after all other reasonable alternatives have been exhausted. For these waterbodies, the probability of success for installing pipe with an HDD or conventional bore is very high. GSX-US is requesting approval to install using the open cut method only as a contingency plan with a very low likelihood of its use.

There is not a hard and fast rule for the number of times an HDD or conventional bore is attempted before the decision is made to use the open cut method. Factors that may be considered in this decision are the specific cause of the failure and the soil conditions encountered.

For example, the corrective measure may involve a determination that the existing hole encountered a void, which could be bypassed with a slight change in the profile. In other cases, it may be determined that the existing hole encountered a zone of unsatisfactory soil material and the hole may have to be abandoned. In this case, it may be possible to use an alternate adjacent alignment contained in the right-of-way to drill a new hole.

The open-cut, flume technique involves diverting stream flow into a carefully positioned steel pipe of suitable diameter to convey the entire flow of the stream.

Instream construction activities are generally limited to:

- Polyethylene sheeting at flume pipe inlet and outlet points;
- Diversion structures/flume support consisting of sandbags; and
- Baffle structures to dissipate flow energy at the flume pipe outlet.

The installation method begins with one diversion structure being placed at the upstream end of the flume pipe to guide all of the stream flow into the pipe and a similar downstream dam placed to prevent water from backflowing into the “dry” section. Once stream flow is being conveyed through the flume pipe, activities for installing the pipeline begin.

Conventional pipeline trench installation is accomplished using hydraulic excavation equipment beneath the flume pipe. This technique allows turbidity associated with trenching to be kept between the dams with no interruption to the downstream flow and volume of the stream. Excavated material is moved away from the crossing and stored for subsequent backfilling. Some

seepage of water into the area between the dams occurs from subsurface flow and/or some leakage around and under the temporary dams. This is pumped out as needed into an upland dewatering structure for retention until the sediment settles out and/or the water percolates into the ground. The flume pipe and dams are removed after the pipeline has been installed.

Before the flume pipe is installed in the stream, it would be inspected to ensure it is free of grease, oil, or other pollutants. In addition, excessive dirt would be removed from the flume pipe. The pipe would be steam-cleaned, if necessary, to remove any oil or grease present on the pipe before placement in the stream.

Short-term, elevated levels of turbidity are expected to occur during installation of the flume pipe. However, several measures would be taken to minimize the increased turbidity. Both the inlet and the outlet of the flume pipe would be lined with sandbags and plastic to create a proper seal. The reason for sandbagging the downstream end of the flume is to create a contained area where turbid water is trapped and to prevent downstream water from flowing up the streambed and flooding the trench. Sandbags would be filled with a non-leachable material such as clean, pre-washed sand. Sandbags would be tied securely before they are installed. Sheets of plastic would be interwoven between the layers of sandbags to ensure an effective seal.

Before the flume pipe is installed, at least three rows of sandbags (the dam foundation) would be laid to support the upstream and downstream portions of the flume pipe. All instream work would be carried out on foot and no equipment would operate in the streambed. After the dam foundation is in place, the flume pipe would be lifted over the stream and carefully aligned before it is lowered onto the sandbags. The flume pipe would not be pushed or pulled over the banks and into the water. After the flume is laid on the sandbags, construction on the upstream dam would immediately begin, followed by installation of the downstream dam.

Prior to trenching, any fish in the work area would be removed and released downstream. Removal would be done with seines and fine-mesh dip nets. Two trackhoes would begin trenching from each streambank at the same time and the pipe would be installed as soon as the trenching is complete. Excavated spoils would be stored at least 10 feet away from the stream along the trench and protected with erosion-control devices. The volume of work area that needs to be dewatered is much less for flume crossings than for bore crossings. Groundwater and some seepage of surface water around the dams may enter the trench area and become turbid as the trench is being excavated. The turbid water would be pumped out of the trench area so that it would not accumulate and flow around the downstream dam into the live stream.

The highest potential for causing water quality problems during a flumed crossing is during backfilling of the ditch. If the ditch is backfilled too quickly, the water level in the construction area may overflow or leak over the downstream dam. Pumps must be carefully used during backfilling to control the water level in the construction area, and backfilling must be conducted in a slow, well-planned manner.

Backfilling begins in the center of the stream directly under the flume pipes and proceeds toward each bank simultaneously. In this manner, much of the water in the ditch would be pushed to the ditch outside the stream channel. When complete, the streambed would be compacted and trench

plugs would be installed on both sides of the stream. The instream work area would be fully stabilized prior to removing the flume.

To prevent excessive increases in turbidity during flume removal, the sandbags must also be removed in a controlled, well-planned manner. Sandbags would be removed from the downstream dam first, followed by the upstream dam at a rate dependent on the size and flow of the stream. There would be an initial increase in turbidity downstream of the crossing. However, the water would quickly flow clear again over the construction area. The flume pipe would be lifted out of the crossing area, and the remaining sandbags would be removed by hand.

Additional measures taken to minimize impacts near the stream crossing include using a crew whose sole responsibility is maintenance of the flume. They would have supplies on hand enabling them to apply additional plastic and sandbags to the dams, maintain and operate the pumps, and maintain the discharge structures. When the crossing is complete, the crew's task would be to immediately install erosion-control structures. Pumps and backup pumps would be located in a spill containment structure designed to fully contain any spills of fuel or oil. Backup pumps would be located onsite, hooked up and maintained as fully operational during the entire crossing process. All water would be discharged through dewatering structures, which are essential in preventing the flow of turbid water overland and back into the stream. Runoff-control structures would be used to prevent runoff from the spoil piles or drainage from the trackhoe bucket from flowing around the sandbag/plastic dams and adding sediment to the stream.

Some of the advantages of a flume crossing include:

- Size of excavation;
- Spoil storage area requirements;
- Minimal dewatering;
- Decreased construction time in vicinity of stream;
- Stream flow is maintained;
- Fish passage is maintained;
- Dry/no-flow work conditions in streambed; and
- Cumulative effects of activities in project area are minimized (i.e., no need for extra work space, continuous truck transport of spoil).

There are potential disadvantages associated with a flume crossing. However, GSX-US has developed procedures to control each of the following potential disadvantages:

- Potential for short-term increase in turbidity during dam construction and removal;
- Potential for limited streambed disturbance;
- Potential for leaking dams leading to increase in dewatering requirements (Williams Pipeline Company 2003).

Terasen Gas Alternative

There is no assessment of impaired streams for the Terasen Gas Alternative.

No Action Alternative

The NorskeCanada proposal does not involve pipeline construction.

Mitigation Measures

Proposed Action

No additional analysis required.

Terasen Gas Alternative

No additional analysis required.

No Action Alternative

No additional analysis required.

Significant Unavoidable Adverse Impacts

No additional analysis required.

3.3.8 Issue 7

Issue Summary

Description of Problem

The Final EIS concludes that continued erosion of the (hydrostatic testing) discharge area could occur if it is not properly stabilized after the discharges have been completed. The Final EIS further acknowledges that this is a potentially significant impact, but fails to evaluate the implications of this potential impact or offer any mitigation.

Furthermore, it is unclear how the water will be transferred to the site since it is not all downhill. Almost 99% of the hydrostatic test water (1.58 M gallons) will be discharged onshore at the GSX-US property south of the Cherry Point compressor station. There is no discussion of whether this site will be able to absorb that much discharge without erosion, water quality degradation, or other impacts.

Ecology Requirement

In the environmental review: (1) evaluate potential effects of erosion and mitigation measures and (2) include an expanded discussion of hydrostatic test water discharge to include identification of discharge sites and the area available for groundwater recharge or surface water discharge.

Affected Environment

No additional analysis required.

Impacts

Proposed Action

Hydrostatic test water would be discharged through an approved dewatering structure and energy dissipating device in a manner to minimize disturbance to the environment. Water would be discharged from the pipeline so as not to cause erosion to the ground surface or unfiltered flow into wetlands, streams, or lakes. GSX-US would require samples to be taken of the test water prior to filling or dewatering the pipeline. Water discharge rates would be approximately 500 gallons per minute (gpm).

Two hydrostatic test water discharge sites are identified: the existing Sumas compressor station and the proposed Cherry Point compressor station.

Existing Sumas Compressor Station

The amount of water required for hydrotesting is minimal at this location and is only to be used for fabricated assemblies associated with the interconnects. Hydrostatic test water would be transferred to the test sections through the use of a hose connected to an existing hydrant located at the Sumas compressor station. All hydrostatic test water would be discharged through an approved dewatering structure located upland from an existing stormwater retention pond at the Sumas compressor station.

Proposed Cherry Point Compressor Station

This location is the main source of water for hydrotesting the onshore portion of the U.S. pipeline. Hydrostatic test water would be transferred to the test sections through the use of a hose connected to a hydrant located at the Cherry Point compressor station. All hydrostatic test water would be discharged through an approved dewatering structure located on the south side of the compressor station in a well-vegetated upland area.

The discharge site is a gently sloping, well-vegetated hay meadow that drains to a tributary of Terrell Creek located approximately 250 feet east of the compressor station site. Filtered water leaving the dewatering structure would flow through the well-vegetated upland before entering the tributary of Terrell Creek. Given this distance and the regulation of discharge rate, most of the hydrostatic test water that is discharged would be absorbed by the soils across a wide area. The primary impact would be a temporary flow increase in the tributary. Since no additives are proposed and erosion and sedimentation would be controlled by implementing Best Management Practices (BMPs), no significant impact on water quality is expected.

GSX-US delineated several wetlands west of the proposed discharge location. These wetlands are formed in areas of hill seepage and are at a higher elevation than the discharge site. GSX-US

does not plan on discharging hydrostatic test water directly into these wetlands, and since they are at a higher elevation than the outfall, discharged water would not affect the wetlands.

The effect on stream flow would also be limited by controlling the rate of discharge. The main parameters to consider when discharging hydrostatic test water are the regulation of discharge rate, use of energy dissipation devices, and installation of sediment barriers, as necessary, to prevent erosion, streambed scour, suspension of sediments, or excessive stream flow.

Discharge rate is usually controlled through the use of equipment (called a "drying pig") that is placed in the pipeline upstream from the location where water is to be discharged. The purpose of this pig is to move the water from the upstream location to the discharge point. The pig is moved through the pipeline using compressed air at the upstream location. The rate at which water is discharged can be controlled by adjusting the flow of air into the pipeline and thus increase or reduce the rate at which the pig moves through the line. The discharge rate can also be controlled at the dewatering point by opening or closing a valve. When a pump is used in the dewatering process, its speed can be adjusted to control the discharge rate.

Typically, hydrostatic test water is discharged at a rate of 500 gpm based on the maximum capacity of a 4-inch pump. If site-specific conditions allow, GSX-US may use a larger pump (6 inches) that can discharge water at a rate of up to 1,000 gpm. As a point of reference, 500 gpm is equivalent to about 1 cubic foot per second. In light of the dissipation and buffering effects described above, discharge rates of this magnitude would be expected to have only a minimal effect on stream flow.

However, as explained above, the discharge rate can be regulated. Based on an evaluation of onsite conditions (e.g., discharge water is ponding, causing erosion outside the dewatering structure, contributing to streambed scour or suspension of sediments), the discharge rate can immediately be reduced to deal with these scenarios. In addition, the dewatering structure can be moved to an alternate location if it is determined that the water is not being sufficiently absorbed by the surrounding area. The Environmental Inspector would continually monitor the discharge to ensure that flow rates are not excessive and there are no erosion/scour problems.

Discharge of hydrostatic test water into the tributary to Terrell Creek would be regulated such that flow augmentation would not have a reasonable potential to cause a loss of sensitive or important habitat, substantially interfere with the existing or characteristic uses of the waterbody, result in damage to the ecosystem, or adversely affect public health.

Discharged water would be directed into a dewatering structure constructed with silt fences and straw bales. The purpose of the structure is to dissipate energy, prevent erosion, and filter the test water. This type of structure has been approved for use by Washington State and federal agencies on previous projects (Williams Pipeline Company 2003).

Terasen Gas Alternative

There is no information on hydrostatic testing for the Terasen Gas Alternative.

No Action Alternative

No additional analysis required.

Mitigation Measures

Proposed Action

No additional analysis required.

Terasen Gas Alternative

No additional analysis required.

No Action Alternative

No additional analysis required.

Significant Unavoidable Adverse Impacts

No additional analysis required.

3.3.9 Issue 8

Issue Summary

Description of Problem

The Final EIS does not include a discussion of a site-specific plan for the HDD at Cherry Point. Mitigation measures are not adequately addressed/not previously disclosed. Proximity to a sensitive area (aquatic reserve) makes this a significant issue.

Ecology Requirement

Given the sensitive nature of the Cherry Point shoreline, include the site-specific plan for the HDD at this location in the environmental review.

Affected Environment

No additional analysis required.

Impacts

Proposed Action

The HDD at Cherry Point involves two areas of disturbance, one onshore drill entry hole and one offshore drill exit hole. The drill entry workspace is located in a hayfield approximately 1,000 feet away from the bluff at Cherry Point. No ground disturbance is anticipated between the entry hole workspace and the exit hole. The entry point workspace would occupy an area of about 7.7 acres. Use of the area would be temporary and the site would be returned to a hay meadow upon completion of the project.

The exit hole of the HDD is located about 2,200 feet away from the nearest area of marine vegetation. At Gulf Road, GSX-US proposes several measures as described on pages 3-70 and 3-72 of the Final EIS. Further protections are provided by implementation of two biological windows established by Washington Department of Fish and Wildlife (WDFW), U.S. Fish and Wildlife Service (USFWS), and the National Marine Fisheries Service (NMFS) that further restrict the timing of HDD activities (refer to page 3-70 of the Final EIS). The Corps has indicated adherence to these timing restrictions is a condition of Clean Water Act authorization.

The purpose of the exit hole is to capture the drilling mud and to provide a surface that conforms to the seabed so that the pipeline does not incur overstress at the exit point. Excavation of the exit hole would result in about 1,946 cubic yards of sediment disturbance. Suspended sediments would settle back to the seafloor within a few hours of excavation. The dimensions of the exit hole would be approximately 172 feet long and 3 to 16 feet deep. Given the nature of current patterns in the area, the Final EIS concluded there is little probability that sediment would travel upslope (toward the shore) and affect macrophytes in the shallow water area.

A total of 62.1 acres of wetland would be affected by construction of the project. Of this total, 0.76 acre of palustrine emergent wetland is located within the entry hole workspace. This emergent wetland would be temporarily affected by construction, but would be restored to pre-construction conditions.

Impacts from the HDD at Cherry Point would be localized (entry and exit workspace only), temporary (e.g., limited to the duration of construction; recolonization by benthic organisms would occur within one to two years), and would not result in significant impact. However, the Final EIS acknowledges that an inadvertent release of drilling mud could affect marine vegetation if the release occurred within the bands of marine vegetation. Geotechnical studies conducted by GSX-US demonstrated that the overlying sediments are such that a release to the seafloor is considered unlikely. FERC requires GSX-US to conduct a post-construction survey to quantify any impact of drilling mud on marine vegetation and consult with WDNR, WDFW, NMFS and other applicable agencies to develop suitable mitigation for observed impacts.

Terasen Gas Alternative

No additional analysis required.

No Action Alternative

No additional analysis required.

Mitigation Measures

Proposed Action

No additional analysis required.

Terasen Gas Alternative

No additional analysis required.

No Action Alternative

No additional analysis required.

Significant Unavoidable Adverse Impacts

No additional analysis required.

3.4 GROUNDWATER

3.4.1 Applicable Sections in FERC Documents

Please refer to Section 3.3.1 in the FERC Final EIS and Resource Report 2, Water Use and Quality, in Exhibit F-1 of GSX-US's original application to FERC.

3.4.2 Issue 1

Issue Summary

Description of Problem

The Final EIS does not provide a map of well locations. The public should be advised through the environmental review process of wells that may be affected rather than waiting until permits have been issued and construction has commenced. In addition, it is likely that many landowners will be unable to verify details of their well's construction, depth, or yield.

Ecology Requirement

Evaluate and document in the environmental review the locations of private wells within 200 feet and municipal wells within 400 feet of the project.

Affected Environment

Resource Report 2 provides a map of groundwater well locations on page 2-5.

Impacts

Proposed Action

No additional analysis required.

Terasen Gas Alternative

No additional analysis required.

No Action Alternative

No additional analysis required.

Mitigation Measures

Proposed Action

No additional analysis required.

Terasen Gas Alternative

No additional analysis required.

No Action Alternative

No additional analysis required.

Significant Unavoidable Adverse Impacts

No additional analysis required.

3.5 PLANTS AND ANIMALS

3.5.1 Applicable Sections in FERC Documents

Please refer to Section 3.6 in the FERC Final EIS and Resource Report 3, Fish, Wildlife, and Vegetation, in Exhibit F-1 of GSX-US's original application to FERC.

3.5.2 Issue 1

Issue Summary

Description of Problem

The FERC Final EIS conclusion that turbidity will not affect salmonids or other ocean fish is not documented. On page 3-69, the Final EIS states, "based on the published data, it is unlikely that the locally elevated turbidity generated by pipeline installation would directly affect juvenile or adult salmonids or other marine fish that could be present." No such published data are cited in either this section or in Section 3.6.1 for ocean fish.

Ecology Requirement

Provide citations in the environmental review of the appropriate literature to support the above conclusion.

Affected Environment

No additional analysis required.

Impacts

Proposed Action

The following citations are referenced on pages 3-63 and 3-65 of the FERC Final EIS, and shown in Appendix M – References, as follows:

Bisson, P. A, and R. E. Bilby. 1982. Avoidance of Suspended Sediment by Juvenile Coho Salmon. North American Journal of Fisheries Management 4:371-374.

Blais, D. P., and D. L. Simpson. 1997. The effects of a buried natural gas pipeline on water quality, stream habitat, and biotic populations within high quality cold water streams in upstate New York. In Sixth International Symposium on Environmental Concerns in Rights-of-Way Management. Eds. J. R. Williams, J. W. Goodrich-Mahoney, J. R. Wisniewski, and J. Wisniewski. February 24-26, 1997. New Orleans, Louisiana. Elsevier Publishers, New York, New York.

Cyrus, D. P., and S. J. M. Blaber. 1987b. The Influence of Turbidity on Juvenile Marine Fishes in Estuaries. Part 2: Laboratory Studies, Comparisons with Field Data and Conclusions. Journal of Experimental Marine Biology and Ecology 109:71-91.

Servizi, J. A. 1988. Sublethal Effects of Dredged Sediments on Juvenile Salmon. Pages 57-63 in C.A. Simenstad, editor. Effects of Dredging on Anadromous Pacific Coast Fishes. University of Washington, Seattle.

Vincour, W. S. and J. P. Shubert. 1987. Effects of gas pipeline construction on the aquatic ecosystem of Canada Creek, Presque Isle County, Michigan. Gas Research Institute Report GRI-87/0027.

Whitman, R. P., T. P. Quinn, and E. L. Brannon. 1982. Influence of Suspended Volcanic Ash on Homing Behavior of Adult Chinook Salmon. Transactions of the American Fisheries Society 111:63-69.

Terasen Gas Alternative

No analyses on the potential impacts of turbidity are available for the Terasen Gas Alternative.

No Action Alternative

No analyses on the potential impacts of turbidity are available for the NorskeCanada proposal.

Mitigation Measures

Proposed Action

No additional analysis required.

Terasen Gas Alternative

No additional analysis required.

No Action Alternative

No additional analysis required.

Significant Unavoidable Adverse Impacts

No additional analysis required.

3.5.3 Issue 2

Issue Summary

Description of Problem

The FERC response to Draft EIS comments LA1-13 and 14 with respect to non-listed federal and state species is not adequate. The only marine fish species discussed in Section 3.6.2 that are not mentioned in the Essential Fish Habitat species listed in Table 3.6.3-1 are Pacific herring, surf smelt, and (Pacific) sand lance. Species such as Puget Sound rockfish, rock greenling, white-spotted greenling, wolf eel, and all the sculpin species (except cabazon) that could be affected are not mentioned anywhere.

Ecology Requirement

Summarize and include information from Appendix 3-1 of Resource Report 3, Fish, Wildlife, and Vegetation, in Exhibit F-1 of GSX-US's original application to FERC and information from the surveys of subtidal benthic biodiversity and associated habitats along the proposed Georgia Strait pipeline route in the SEPA document.

Affected Environment

Information on marine fish in the project area was provided in Resource Report 3, Appendix 3-1, Section 2.2. The reference for this report is:

Fairbanks, C. and M. Terra. 2000. Georgia Strait Crossing Project nearshore marine habitat survey and review of existing information of marine biology and fisheries resources. Tech. rep. by Duke Engineering & Services for WESTECH Environmental Services, Inc.

Additional marine fish information was collected during two remotely operated vehicle surveys sponsored by GSX-US. The reference for this report is:

McDaniel, N.G. and R. Glaholt. 2002. Surveys of subtidal benthic biodiversity and associated habitats along the proposed Georgia Strait Crossing pipeline route. Tech. rep. by TERA Environmental Consultants for Georgia Strait Crossing Pipeline Ltd.

Impacts

Proposed Action

No additional analysis required.

Terasen Gas Alternative

No analyses of marine fish were available for the Terasen Gas Alternative.

No Action Alternative

No analyses of marine fish were available for the NorskeCanada proposal.

Mitigation Measures

Proposed Action

No additional analysis required.

Terasen Gas Alternative

No additional analysis required.

No Action Alternative

No additional analysis required.

Significant Unavoidable Adverse Impacts

No additional analysis required.

3.5.4 Issue 3

Issue Summary

Description of Problem

The Final EIS does not discuss impacts on the fishing industry, and specifically the potential significant impact on the bottom trawl fishery. Further, no mitigation measures were recommended.

Ecology Requirement

Include a discussion of fishing issues, impacts, and mitigation measures in the environmental review should. More thoroughly evaluate and discuss the cumulative effect the project would have on the sea bottom and bottom trawling.

Affected Environment

No additional analysis required.

Impacts

GSX-US

In February 2001, GSX-US met with WDFW personnel at the WDFW's La Conner field. One of the specific objectives of this meeting was to discuss offshore fishing areas in relation to the marine alignment sheets. WDFW personnel stated that fishing pressure in the vicinity of the project is heaviest comparatively close to the Washington coast. Farther offshore in the Georgia Strait, fishing pressure is not as intense near the proposed marine pipeline route as it is farther to the north. The commercial fishing areas were identified in Resource Report 3 (refer to Figures 3.1-1, 3.1-2, and 3.1-3, and accompanying text).

In December 1999, the Applicant communicated with a commercial fisherman via telephone. The fisherman expressed concern about the pipeline interfering with bottom fishing efforts, and particularly damage to or from the pipeline on fishing gear. As a follow up to this conversation, GSX-US met with three commercial fishermen, including a crab fisherman, in Bellingham, in January 2000. At that meeting, the fishermen again expressed concerns about bottom trawl gear encountering the pipeline. They stated that they generally fish in waters varying from about 120 to 720 feet deep, but that their operations are confined to the first eight miles of the marine pipeline route. They stated that they didn't think the remainder of the U.S. portion of the marine route would greatly affect commercial fishermen. This comment was consistent with the information on fishing pressure provided by WDFW during the February 2001 meeting.

The crab fisherman stated that most crab fishing is done in waters varying from about 24 to 300 feet in depth and expressed concerns about crabs being able to cross a pipeline lying on the bottom. During a meeting in April 2000, WDFW personnel stated that most commercial and recreational crab fishing occurs in water less than 100 feet deep. This communication was also reported on page 3-6 in Resource Report 3. However, as reported on page 3-6 of Resource Report 3, the Cherry Point area has a comparatively small commercial crab harvest. In response to crab fishing concerns raised by both U.S. and Canadian parties, the Applicant sponsored a study to assess the potential for a pipeline to act as a barrier to crabs and certain other invertebrates. The findings of that study, contained in Appendix 3-1 of the Resource Report 3, are summarized below.

Disruption of Commercial or Recreational Fishing

Construction of the pipeline has the potential to temporarily disrupt commercial and recreational fishing (marine construction of the pipeline is expected to take about 30 days). GSX-US identified the primary commercial fishing areas in Resource Report 3 and provided an additional discussion of the fisheries resources and commercial fishing in Appendix 3-1 of Resource Report 3. During pipe laying and trenching operations, fishermen will be less likely to fish in proximity to the moving construction spread. Crab fisherman active in the area during construction may be forced to pull gear to avoid it from being damaged or lost. However, because the vessels directly involved in pipeline construction will move very slowly (approximately one mile per 24-hour period), it is expected that commercial and recreation fishermen will be able to readily avoid gear losses resulting from construction vessels.

Impacts to the fishing industry after the pipeline is in operation are also expected to be minor. Although pipelines sometimes do interfere with fishing gear, it has also been reported that pipelines are fished by some trawlers, since some minor artificial reef effect may occur whereby fish congregate and greater catch rates may occur (DTI Oil and Gas Environmental Consultation Site 2003). Evidence suggests that pipelines up to 40 inches in diameter cause only minimal gear damage. However, they may affect the gear geometry and efficiency once past the obstruction (Valdemarsen 1993). Seabed evaluations conducted by GSX-US consultants identified blocks and boulders greater than 2.5 feet in diameter along the pipeline route. These are natural obstructions on the seabed that fishermen normally have to contend with (Jacques Whitford and Associates 2002; Terra Remote Sensing Inc. 2001).

Impacts to Fisheries Resources

Impacts to marine fisheries were discussed on pages 3-68 through 3-88 of the FERC Final EIS. GSX-US also discussed potential impacts in Resource Report 3. GSX-US recognizes that any project activities that significantly affect marine biota also have the potential to effect commercial and recreational fisheries.

GSX-Canada

Potential environmental effects to fish from pipeline activities identified by GSX-Canada in its environmental assessment included direct effects through turbidity and mortality; habitat alteration; and sensory disturbance. Soft-bottom fish habitats could be temporarily altered as a result of pipe trenching.

GSX-Canada contended that most adult fish have sufficient mobility to avoid being crushed by pipe lay and trenching operations. In addition, most potentially affected fish species have free-floating, often pelagic eggs and larvae, which should also not be vulnerable to burial or substantial direct mortality. GSX-Canada also predicted that rapid sediment covering of the pipe in the trench and subsequent more gradual natural infill of the trench would result in the functional restoration of the structural and biological productivity of these communities for fish. Where the pipeline is exposed, new long-term hard-bottom substrate would be created on the seabed. In these areas, a reef effect would likely occur and the pipe could be expected to be colonized to varying degrees by, or to attract, otherwise, a variety of fish species (e.g., rockfish, sculpin, and lingcod).

In its report, the Joint Review Panel concluded that potential effects of turbidity and mortality, habitat alteration, and sensory disturbance to deepwater marine fish from the proposed GSX-Canada pipeline would not be significant (National Energy Board 2003).

Terasen Gas Alternative

No analyses of fisheries impacts were available for the Terasen Gas Alternative.

No Action Alternative

No analyses of fisheries were available for the NorskeCanada proposal.

Mitigation Measures

Proposed Action

Based on the information available for commercial fishing as well as other project concerns, GSX-US proposed several mitigation measures to address the concerns raised by commercial fishing interests, including:

- One of the criteria used to select the marine route location was to minimize, to the extent practicable, the distance traversed through known important marine areas. Due to the extent of the commercial fishing areas along the northwest Washington coast (refer to Figures 3.1-1, 3.1-2 and 3.1-3 in Resource Report 3), it would not be possible to avoid these areas altogether. However, much of the route proposed by GSX-US traverses areas of less intense commercial fishing pressure (page 3-18 of Resource Report 3), as identified by both the Washington State agencies and commercial fishermen.
- GSX-US recognized (page 3-14 of Resource Report 3) that construction of the marine portion of the pipeline could interfere with commercial or recreational fishing. However, due to the comparatively small size of the area affected by pipeline construction activities at any one time, GSX-US believes that this impact would not be substantial.
- GSX-US has proposed to use the HDD technique to install the pipeline from onshore in the Cherry Point area to a depth of –130 feet mean lower low water (MLLW). This depth would avoid or minimize effects to nearshore marine habitats that are recognized for their value to commercial and recreational fishing resources, as well as other resource values
- On page 3-16 of Resource Report 3, GSX-US reported the results of a study to determine the barrier effects of a pipeline to crabs and other marine invertebrates. This study concluded that a 21-inch pipeline, buried to one-half its diameter, would not constitute a substantial barrier to the movement of crabs. As discussed on pages 3-15 and 3-16 of Resource Report 3, it is anticipated that the pipeline would settle into the bottom sediments relatively quickly, and that sediment transported along the bottom by marine currents would eventually accumulate around the pipeline. However, GSX-US has proposed to place the pipeline in a shallow trench to a depth of approximately –240 feet MLLW for the first 5.6 miles of the marine route. This burial would ensure that the pipeline does not constitute a barrier to crab movement over most of the fishing depths reported by commercial fishermen, and the depths identified as most important for crab fishing identified by the WDFW.
- The pipe would have a 1.6-inch thick, wire reinforced concrete coating, which will provide additional protection from potential impacts of trawling gear.
- The pipeline would be identified on navigational charts and precautions similar to those for avoiding other existing features (e.g., cables, boulder fields, rock outcrops) would need to be taken by fisherman in the area.
- During pipeline construction, support vessels will act as pilot boats ensuring that fishing vessels are forewarned of the construction activities;

- A general awareness of the pipeline through meetings already held with resource users and a Notification to Mariners prior to construction will further reduce encounters with the pipeline; and
- To notify small boat traffic, notices will be placed at marinas and in local newspapers. The U.S. Coast Guard will be notified and will communicate the location of the construction vessels to inbound and outbound vessels in the project area.

Terasen Gas Alternative

No analyses of marine fish were available for the Terasen Gas Alternative.

No Action Alternative

No analyses of marine fish were available for the NorskeCanada proposal.

Significant Unavoidable Adverse Impacts

With the use of specialized construction, and incorporation of proposed mitigation, significant adverse impacts would not be expected.

3.5.5 Issue 4

Issue Summary

Description of Problem

The Final EIS states that Class B and C noxious weeds were observed along the proposed route, but does not tell the reader which ones were observed. The analysis does not contain conclusions about whether the proposed project would increase or decrease the prevalence of noxious weeds/invasive species in the project area. The document states that a control plan would be developed. However, without details on what methods (e.g., herbicides, manual removal, surface treatments) would be used, it is difficult to defend a conclusion that weeds would not spread because of the project. It is very likely that any new pipeline right-of-way in Whatcom County has a high likelihood of becoming dominated by invasive species without aggressive maintenance.

Ecology Requirement

Colonization of invasive weed species is frequently a problem in pipeline corridors. Identify the noxious weeds observed during field surveys in the environmental review and analyze impacts to discuss fully the potential effects of the project. Also, evaluate and discuss potential mitigation measures to address these impacts more fully.

Affected Environment

Table 3.3-2 on page 3-65 of Resource Report 3 identifies the noxious weeds observed during resource surveys, including Class B and C weeds. The Resource Report also describes locations in the project area where noxious weeds were most concentrated.

Impacts

Proposed Action

The Resource Report also states "where noxious weeds are already established, they will likely invade the right-of-way." Based on this statement, and the fact that resource surveys observed 16 different species of Class B and C noxious weeds, it is reasonable to conclude that the proposed pipeline will increase the risk of spread for at least some of these species, particularly in areas of new right-of-way. In particular, many riparian and wetland areas adjacent to the proposed right-of-way are infested with reed canarygrass. Any removal of tree and shrub cover is likely to favor this species.

Terasen Gas Alternative

No analysis of noxious weeds is available for the Terasen Gas Alternative.

No Action Alternative

No analysis of noxious weeds is available for the NorskeCanada proposal.

Mitigation Measures

Proposed Action

GSX-US prepared a Noxious Weed Management Plan and submitted the plan to Whatcom County and Ecology. Page 3-40 of the Final EIS states that the applicant "will focus weed control measures where noxious species are confined to isolated stands within the right-of-way" to prevent new outbreaks. The weed management plan should include measures appropriate to control noxious weeds in upland and wetland conditions. Where application of herbicides is allowed (i.e., uplands), this method would likely be effective in controlling the spread of noxious weeds. Where application of soluble chemicals is prevented by FERC conditions (i.e., within 100 feet of wetlands), manual removal and installation of native plants would be recommended to control the spread of noxious weeds, particularly reed canarygrass.

Terasen Gas Alternative

No analysis of noxious weeds is available for the Terasen Gas Alternative.

No Action Alternative

No analysis of noxious weeds is available for the NorskeCanada proposal.

Significant Unavoidable Adverse Impacts

Implementation of a noxious weed management plan with the characteristics described above would be expected to minimize potential negative environmental impacts from noxious weeds along the proposed right-of-way.

3.5.6 Issue 5

Issue Summary

Description of Problem

The Final EIS indicates that GSX-US would need a variance from FERC for access roads or staging areas that disturb wetlands. The Final EIS acknowledges that four access roads and the Gulf Road pipestring fabrication would affect wetlands. However, no details are provided regarding the extent of the potential impacts.

Ecology Requirement

Include the information on the Preliminary Construction Alignment Sheets regarding the change of the access road to avoid wetlands in the SEPA document.

Affected Environment

No additional analysis required.

Impacts

Proposed Action

At the request of FERC, GSX-US revised its plans in order to avoid the placement of fill materials for access roads in wetlands. In one case, GSX-US relocated an access road from a location outside the construction right-of-way to a location within the right-of-way in order to avoid placement of fill in a wetland. The revised access road alignments are shown on the updated Preliminary Construction Alignment Sheets provided to Ecology and the EIS consultant.

GSX-Canada

The proposed GSX-Canada pipeline route traverses eight wetlands greater 0.02 acres in size that were documented and characterized in the vegetation assessment of the project area. The proposed route does not traverse any wetlands designated for the Cowichan subunit of East Vancouver Island (GSX-Canada, Volume 4, Section 5, pg. 28. April 2001).

Terasen Gas Alternative

No analysis of potential wetland impacts is available for the Terasen Gas Alternative.

No Action Alternative

No analysis of potential wetland impacts is available for the NorskeCanada proposal.

Mitigation Measures

Proposed Action

No additional analysis required.

Terasen Gas Alternative

No analysis of potential wetland impacts is available for the Terasen Gas Alternative.

No Action Alternative

No analysis of potential wetland impacts is available for the NorskeCanada proposal.

Significant Unavoidable Adverse Impacts

No additional analysis required.

3.5.7 Issue 6

Issue Summary

Description of Problem

The Final EIS states that the compensatory wetland mitigation plan has been filed with the U.S. Army Corps of Engineers and Ecology. While incorporated by reference, it is not readily available to the public for review.

Ecology Requirement

The Applicant will provide a summary of the wetland restoration plan for inclusion in the SEPA document.

Affected Environment

No additional analysis required.

Impacts

Proposed Action

No additional analysis required.

Terasen Gas Alternative

No additional analysis required.

No Action Alternative

No additional analysis required.

Mitigation Measures

Proposed Action

Mitigation Approach

Waterbody and wetland crossings have been avoided where possible. Where unavoidable, measures have been implemented to minimize impacts. Measures to avoid and minimize impacts include:

- Trenchless methods (horizontal directional drilling or conventional boring) will be used where technically feasible to cross important streams (and adjacent wetlands) as determined through consultation with WDFW biologists.
- Drill and bore entry and exit points were located outside forest and scrub-shrub wetlands to the extent possible.
- Valve site locations or layout areas were selected or designed to avoid permanent fill in wetlands.
- The Cherry Point compressor station was relocated from its originally proposed location to avoid permanent fill in a palustrine emergent wetland.
- The alignment and extra work space were designed or modified where possible to avoid wetlands.
- Staging areas, pipe storage sites and other ancillary facilities were selected in upland sites.
- Existing pipeline, road and powerline corridors were followed for most of the route.
- The construction right-of-way was narrowed from 100 to 75 feet (except in agricultural wetlands and certain extra workspace areas).
- Design was modified to minimize extra workspace in wetlands.
- The route was selected to avoid forested wetlands where possible.

This summary and the more detailed Wetland and Riparian Restoration Plan present GSX's proposed mitigation plans to restore waterbody/riparian areas and wetlands that could not be avoided during construction. The mitigation approach for unavoidable impacts includes onsite

restoration, compensatory mitigation for non-riparian wetlands and compensatory mitigation for riparian areas.

Onsite Restoration

Onsite restoration will be implemented so that no net loss of acreage is associated with riparian areas or wetlands. Riparian and wetland functions, however, will be temporarily affected, especially in shrub- and tree-dominated areas. Functions will also be affected during the life of the project as a 10-foot wide zone centered over the pipeline is maintained in herbaceous vegetation and woody plants are limited to a 15-foot height in a 30-foot wide zone centered over the pipeline.

The primary goal of restoration is to reestablish vegetation communities comparable to those impacted by proactively seeding and planting native species that are present in riparian areas and wetlands disturbed by the project. Wetland and Waterbody Construction and Mitigation Procedures were presented in the Georgia Strait Crossing Project Final EIS. Those procedures were revised October 2002. Restoration prescriptions are presented in the Wetland and Riparian Restoration Plan. Site-specific restoration specifications have been developed for named streams including all streams with fisheries. Typical restoration specifications will be applied to minor tributaries, ditches and non-riparian wetlands.

Woody riparian vegetation occurs at 28 of the waterbodies that will be crossed during construction, 7 of which will be crossed using trenchless methods and 8 of which are ditches with only a few scattered shrubs or trees. Where it occurs, woody vegetation will be cut off at ground level within the construction right-of-way. Tree stump removal and grading activities will be limited to directly over the trench, however, stumps or root systems not affected by trench excavation will be left in the ground to provide streambank stability. Streambanks will be stabilized and temporary sediment barriers installed within 24 hours of completing the crossing. Bank stabilization will be completed prior to returning flow to the channel. All streambanks, channelized streams and ditches will be restored to their approximate original contours.

All streambeds and ditch bottoms will be restored to their original configuration. Clean gravel will be used for the upper 1 foot of trench backfill in the streambeds of selected waterbodies that contain fisheries. Remaining water bodies with identified fisheries will be crossed using trenchless methods. Clean gravel will also be used in the upper 1 foot of trench backfill in the streambeds of open-cut impaired waterbodies (303[d] listed sites) to stabilize the trenchline and reduce potential sedimentation.

Woody debris will be placed in the floodplains of selected waterbodies to increase biologic diversity for plants and animals, provide protection for establishing vegetation, contribute complexity to the floodplain, and increase floodplain roughness, thereby decreasing potential overbank flow velocities and resultant avulsion.

Topsoil will be respread over those areas from which it was stripped; redistribution depths will vary depending on stripping depths. Topsoil will not be mixed with spoil material at any time during salvage or replacement activities. Amendments (lime, fertilizer, mulch) will not be

applied to redistributed soils. GSX-US will cross agricultural wetlands in a manner consistent with the way the land is normally managed for agriculture. Soils that have been compacted, are heavily crusted or consist of large clods will be chisel plowed, disced, or harrowed, depending on equipment limitations. The seedbed will be left in a roughened condition adequate to capture precipitation, reduce runoff, and provide microsites for seed germination.

Three revegetation types that include primarily hydrophytic species present in non-agricultural preconstruction communities will be established: Herbaceous Wetland, Shrub Wetland, and Forested Wetland. The Herbaceous Wetland revegetation type is a composite of existing palustrine emergent plant communities on the project. The Shrub Wetland and Forested Wetland revegetation types are equivalent to palustrine scrub-shrub and palustrine forest communities present on the project.

Proposed seeding and planting specifications are described in detail in the Wetland and Riparian Restoration Plan. Commodity crops in agricultural lands will be revegetated according to landowner preference. Where the GSX disturbance corridor overlaps existing cleared rights-of-way, herbaceous species that reflect existing vegetation on those rights-of-way will be seeded.

Permanent erosion and sediment control measures primarily include established vegetation cover and water bars. Erosion control fabrics will be applied to some areas to provide interim erosion control until vegetation cover has been established. The use of mulch is not proposed at waterbody/riparian or wetland areas. All existing non-agricultural riparian buffer zones that are disturbed will be revegetated with appropriate native species.

The construction schedule across waterbodies will be in compliance with waterbody timing windows described in the Final EIS. In-stream construction activities are limited to the period from June 15 to September 1 for those waterbodies known to contain chinook salmon and from June 15 to October 15 for all other waterbodies with fisheries. In general, waterbodies will be crossed during periods of low flow that will avoid periods of resident and spawning species' life cycles. Wetlands are proposed to be crossed during the summer/fall season when water levels should be lower. Revegetation activities will be determined by construction schedules, seasonal climatic conditions and site conditions. Seeding and planting will be coordinated with other reclamation activities to occur as soon after seedbed preparation as possible, weather and soil conditions permitting, ideally during the locally recognized planting season (September 15 to October 15).

Restored waterbodies/riparian areas and wetlands will be protected utilizing traffic management, maintained erosion and sediment control structures, fencing, selective vegetative maintenance, and noxious weed control. Monitoring and inspection will be conducted during construction/restoration activities to ensure environmental compliance. Following construction and restoration, the GSX pipeline right-of-way will be evaluated to assess revegetation success, and the effectiveness of erosion and sediment control measures. The right-of-way will also be patrolled from the air on a regular basis.

Compensatory Wetland Mitigation

To compensate for the temporary and life-of-project changes in wetland functions, a compensatory wetland mitigation area is being developed. A Preliminary Compensatory Wetland Mitigation Plan was provided to the regulatory agencies in April 2002. The preliminary plan was revised to address comments from the Corps (May 5, 2003) and resubmitted to the Corps. Comments from Ecology (May 29, 2003) were responded to by letter with a commitment to provide additional compensatory wetland mitigation.

The compensatory wetland mitigation site is located along the pipeline route just east of Kickerville Road on land owned by GSX-US (Figure 3.5-1). The site is currently palustrine emergent wetland, herbaceous upland and recently logged upland forest. The existing herbaceous wetland will be enhanced by shrub and tree plantings, and control of reed canarygrass. Not less than 7.0 acres of forest and scrub-shrub wetland will be developed at this site. In order to meet Ecology's recommended replacement ratios, 9.0 acres of additional wetland enhancement is necessary. The search for another mitigation site has begun, and a similar approach will be proposed on the new site as described above for the Kickerville Road site. Both sites will be monitored for 10 years to ensure mitigation success.

Compensatory Riparian Mitigation

To compensate for the temporary and life-of-project changes in riparian functions, a compensatory riparian mitigation area will be developed. The compensatory riparian mitigation site is located along the pipeline route just west of Jackson Road and east of the proposed Cherry Point compressor station on land owned by GSX-US (Figure 3.5-2). The site is a tributary to Terrell Creek with a narrow palustrine emergent wetland along the stream and hay meadow either side of the stream. The site will be planted with trees and shrubs creating 2.2 acres of woody riparian vegetation, of which 0.6 acre will be palustrine forested wetland and 1.6 acres will be non-wetland riparian forest. Plantings will be monitored in conjunction with the compensatory wetland mitigation area to ensure adequate tree and shrub survival.

GSX-Canada

The proposed GSX-Canada pipeline route traverses eight wetlands greater 0.02 acres in size that were documented and characterized in the vegetation assessment of the project area. The proposed route does not traverse any wetlands designated for the Cowichan subunit of East Vancouver Island. Any wetlands that cannot be avoided will be restored during reclamation (GSX-Canada, Volume 4, Section 7, pg. 86. April 2001).

Terasen Gas Alternative

No analysis of potential wetland impacts is available for the Terasen Gas Alternative.

No Action Alternative

No analysis of potential wetland impacts is available for the NorskeCanada proposal.

Significant Unavoidable Adverse Impacts

With the use of proposed construction techniques, and incorporation of proposed mitigation, significant adverse impacts would not be expected.

3.5.8 Issue 7

Issue Summary

Description of Problem

The Final EIS did not adequately address potential impacts to marine vegetation and animals/organisms.

Ecology Requirement

Perform a survey and impact analysis of marine vegetation and animals/organisms, and a mitigation plan prepared and summarized in the SEPA document. Address contingencies for potential impacts to the aquatic reserve in the analysis.

Affected Environment

No additional analysis required.

Impacts

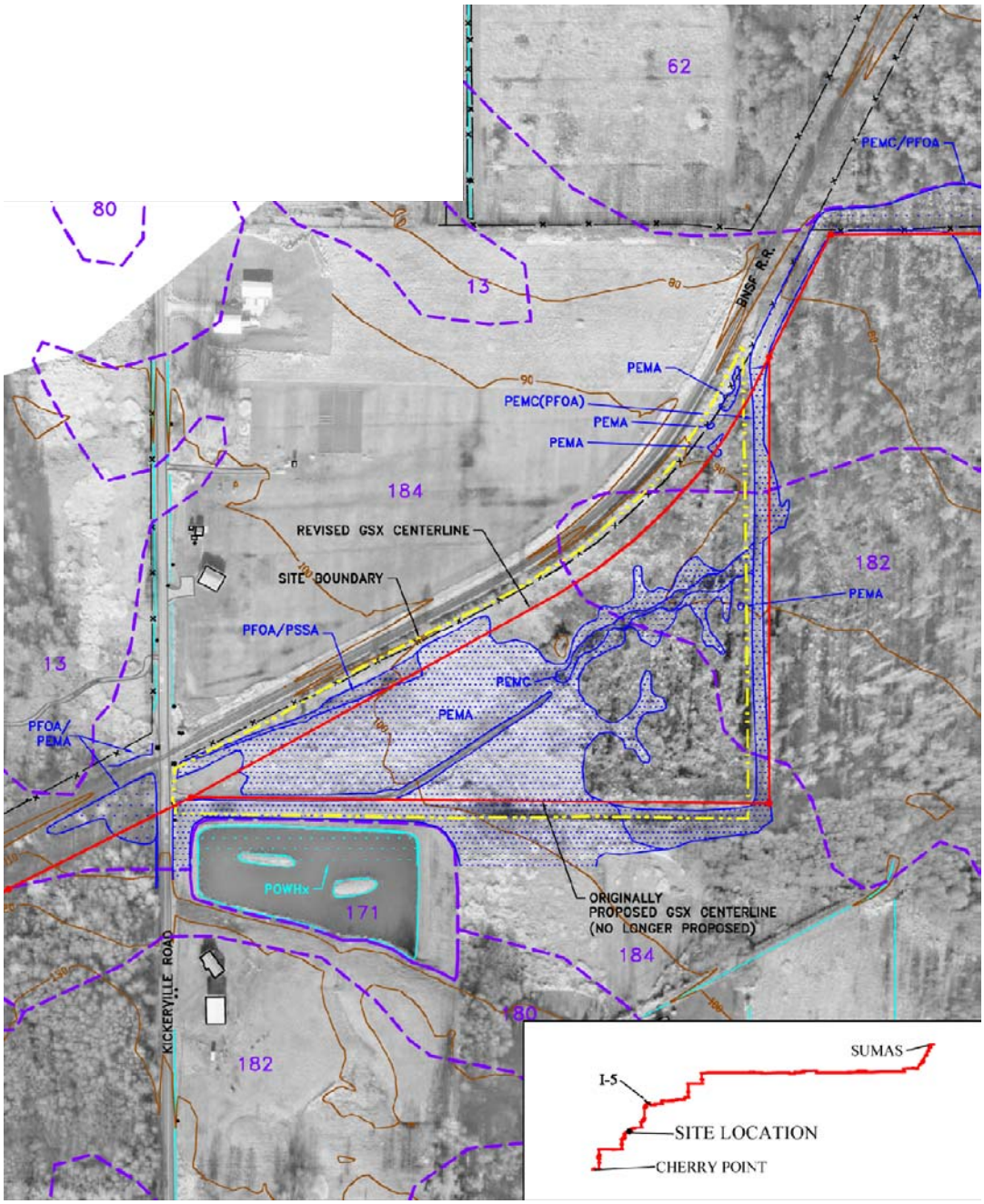
GSX-US

An analysis of potential impacts to marine vegetation and animals/organisms was included on page 3-83 of the FERC Final EIS. A discussion of existing conditions and potential impacts to marine fisheries, wildlife and vegetation resources was also reported in Resource Report 3 of the Environmental Report. The results of a survey of marine vegetation and animals/organisms in the nearshore environment was included in Appendix 3-1 of Resource Report 3.

GSX-Canada

Potential marine environmental effects associated with the HDD for the GSX-Canada project relate primarily to the permanent loss or temporary disturbance of eelgrass habitat. The major impact area would be in the vicinity of the HDD exit hole where suspended sediment and bentonite drilling muds could be transported to nearby eelgrass. Sustained high suspended sediment levels could impair ecological function. Concerns were also expressed about potential effects on nearshore habitat from vessel operation and anchoring. In addition to suspended sediment, concerns were expressed about the potential toxicity of the drilling mud and the viscosifer agent to be used at the HDD marine exit point.

Graphics Server/Graphics/Billable/GSX/Fig 3.5-1wetland 9.15.03



Source: Westech 2003

Approximate Scale in Feet

GEORGIA STRAIT
CROSSING PROJECT

1034001

Soil Type

182	Whatcom-Labounty silt loams, 0-8% slopes
184	Whitehorn silt loam, 0-2% slopes

Wetland Type

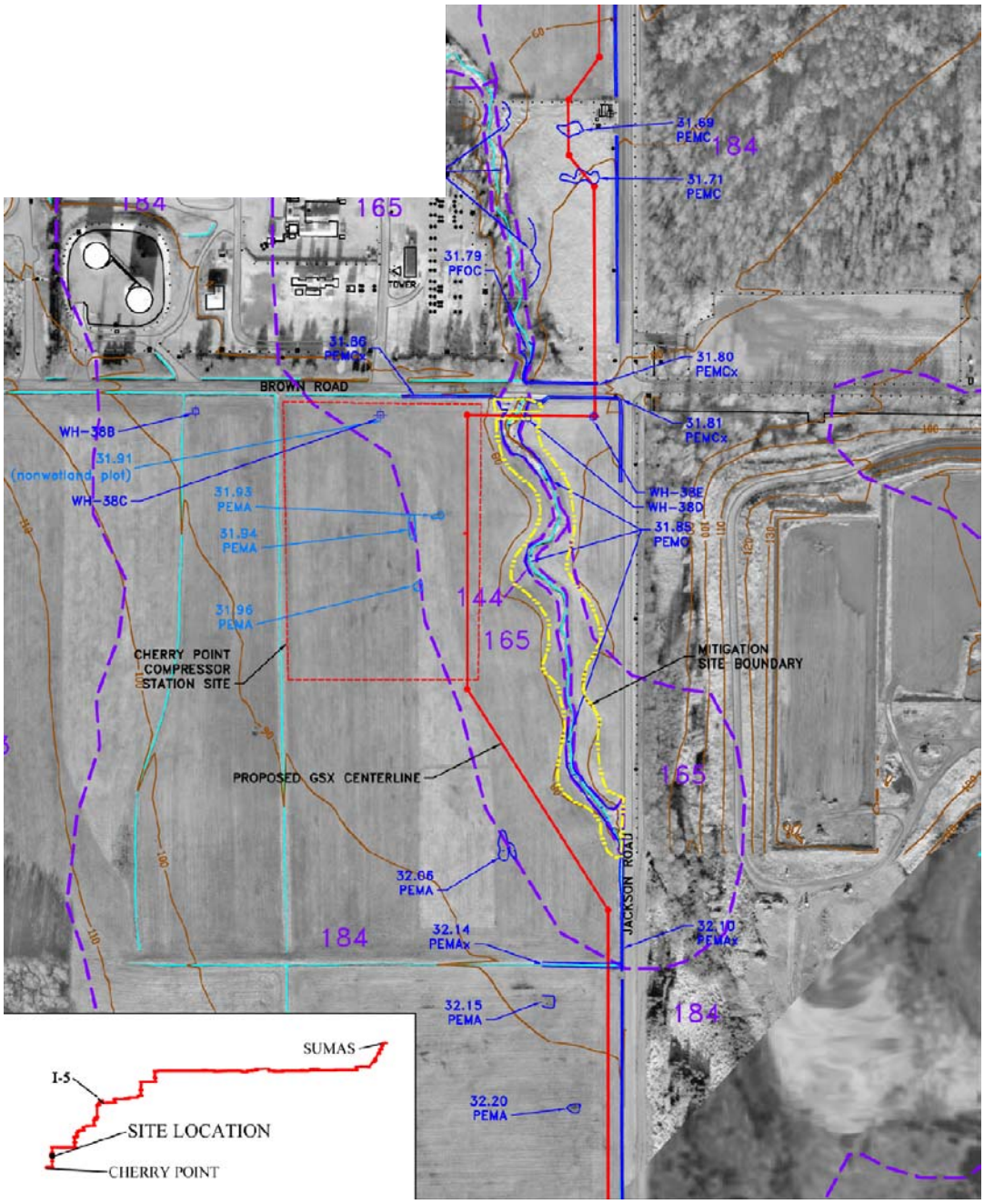
PEMA	palustrine emergent temporarily flooded
PEMC	palustrine emergent seasonally flooded
PFOA	palustrine forested temporarily flooded
POWHx	palustrine open water permanently flooded excavated
PSSA	palustrine scrub-shrub temporarily flooded

FIGURE 3.5-1

COMPENSATORY WETLAND MITIGATION SITE

SHAPIRO & ASSOCIATES, INC.

Graphics Server/Graphics/Billable/GSX/Fig 3.5-2 riparian 9.15.03



Source: Westech 2003

0 400'
Approximate Scale in Feet

GEORGIA STRAIT
CROSSING PROJECT

1034001

Soil Type

144	Shalcar and Fishtrap soils, 0-2% slopes
165	Tromp loam, 0-2% slopes
184	Whitehorn silt loam, 0-2% slopes

Wetland Type

PEMA	palustrine emergent temporarily flooded
PEMAx	palustrine emergent temporarily flooded excavated
PEMC	palustrine emergent seasonally flooded
PEMCx	palustrine emergent seasonally flooded excavated
PFOC	palustrine forested seasonally flooded

FIGURE 3.5-2

COMPENSATORY RIPARIAN MITIGATION SITE

SHAPIRO & ASSOCIATES, INC.

In the event that the Vancouver Island shoreline crossing cannot be accomplished using HDD, a partial HDD or full open cut method would be employed. A partial HDD or full open cut of the landfall would raise many of the environmental issues the HDD is intended to avoid. The partial HDD and the full open cut would require excavation through the foreshore area including shallow subtidal and intertidal zones.

For a full open cut, forest cover on the slope would be cleared from the right-of-way and a dragline or equivalent excavator used to trench the slope. In the absence of an intensive bank stabilization and reclamation effort following full open cut construction, chronic erosion and increased foreshore siltation and turbidity could occur. This outcome would result in proportionately more long-term effects on marine vegetation (National Energy Board 2003).

Terasen Gas Alternative

Looping of the existing Terasen Gas pipeline will involve crossing a number of small streams and two major rivers: the Indian River and Squamish River. The two river crossings will be accomplished with directional drilling, the technique used for installation of current pipeline in 1989. Potential impacts associated with these crossings are expected to be similar to those for the GSX-US and GSX-Canada projects. However, the Terasen Gas Alternative does not call for the crossing of any marine shoreline (Terasen Gas 2003).

No Action Alternative

The NorskeCanada proposal does not call for pipeline construction.

Mitigation Measures

GSX-US

GSX-US acknowledges that it may be necessary, pending the consultation with the WDNR, WDFW, NMFS and other applicable agencies required under FERC Condition 21, to repeat its survey of exiting conditions prior to construction in order to have the most recent data available for the post-construction analysis. If such a survey is required, it would be conducted after the HDD is completed. This is based on the language in FERC Condition 21 that requires the applicant to "…prepare a plan in consultation with…agencies to mitigate observed impacts." As an initial step, an assessment would be made to determine if the HDD had any impact on marine vegetation. Observed impacts would then be mitigated, in consultation with the state and federal resource agencies (Williams Pipeline Company 2003).

GSX-Canada

To ensure that proposed avoidance and mitigation measures are implemented successfully, the Joint Review Panel recommended that GSX-Canada provide a detailed site-specific environmental management plan prior to initiating HDD activities at the Manley Creek landfall. Furthermore, the Panel expects that GSX-Canada would include in the plan a provision to conduct a post-construction survey to quantify the predicted effect associated with the use of the

drilling mud on marine vegetation at the HDD site and discuss options to mitigate any effects. The Panel concluded that, with the implementation of the proposed mitigation measures and the Panels' recommendation, significant adverse environmental effects from the HDD would be unlikely.

In the event of a failed HDD, the Joint Review Panel accepted the reclamation and restoration measures outlined in GSX-Canada's contingency plan for a partial HDD or open cut. However, to ensure the management of potential effects during construction, the Panel recommended that GSX-Canada not proceed with the partial HDD or open cut method at the landfall without developing a detailed site-specific crossing plan and an eelgrass monitoring plan that receives approval from the National Energy Board. The Panel concluded that, with the implementation of GSX-Canada's proposed mitigation measures and the Panel's recommendation, significant adverse environmental effects of a partial HDD or open cut would be unlikely (National Energy Board 2003).

Terasen Gas Alternative

Terasen Gas's existing pipeline corridor was chosen in 1989 on the basis of geotechnical, environmental, land use, and property ownership considerations consistent with current route selection techniques. Geotechnical considerations were particularly important in the selection of the original route. These considerations included topography, surficial geology, surface and subdrainage, and slope stability. The selection of the best route from a geotechnical standpoint was also important to minimize erosion and sedimentation problems. The original crossing of the Squamish River, considered to be the most environmentally sensitive crossing, successfully used the directional drilling technique. The results of Terasen Gas's original studies and construction techniques would be applied to the proposed pipeline looping projects.

No Action Alternative

The NorskeCanada proposal does not call for pipeline construction.

Significant Unavoidable Adverse Impacts

With the use of specialized construction, and incorporation of proposed mitigation, significant adverse impacts would not be expected.

3.5.9 Issue 8

Issue Summary

Description of Problem

On page 3-98 of the Final EIS, the text lists recommended mitigation measures for impacts on bald eagles. These measures do not include avoidance of important bald eagle breeding and wintering forage periods when GSX-US would conduct pipeline maintenance in the future.

Ecology Requirement

Because supplemental bald eagle surveys will not be conducted until after the SEPA process is concluded, summarize information from Resource Report 3 and from WDFW's Bald Eagle Management Plan in the Supplemental EIS.

Affected Environment

GSX-US

According to Resource Report 3 and WDFW's Bald Eagle Management Plan, one bald eagle nest is located within 0.5 miles of the proposed pipeline route, which is within the California Creek territory, #1405. This nest was discovered during follow-up bald eagle surveys in 2001 and 2002. The proposed pipeline would be 60 feet from the nest tree, and the proposed workspace would be within 40 feet of the tree. In addition, during a site visit by Shapiro and Associates, Inc., Department of Ecology, and Williams Pipeline personnel on February 20, 2003, at least eight adult and juvenile bald eagles were observed roosting in a stand of mixed conifers and hardwoods adjacent to the proposed right-of-way crossing of Bertrand Creek. This site has not been verified as a regular roosting concentration by WDFW or USFWS.

GSX-Canada

Bald eagles occur year-round in the GSX-Canada project area and are a listed species of concern in Canada. Most of the project area has moderate to high capability for bald eagle nesting according to published studies. However, several factors have either directly or indirectly acted to reduce the suitability of many areas for that purpose, especially in the eastern half of the project area. Logging and land clearing undoubtedly removed a large number of potential nesting and perching trees. Intensive human activities may have the effect of reducing the suitability of remaining nesting areas in the eastern portion of the project area. No active or inactive bald eagle nests or bird observations were observed during the breeding bird survey. Five bald eagle observations were made during the wildlife study (GSX-Canada, Volume 4, Section 5, pg. 46. April 2001).

Impacts

GSX-US

Given their close proximity, construction and operation of the proposed pipeline is very likely to disturb bald eagles actively breeding at the California Creek nest or roosting adjacent to Bertrand Creek. While bald eagles have shown considerable ability to acclimate to ongoing human activities, the proposed construction would be an unusual activity that does not normally occur in the vicinity of the California Creek territory. Therefore, the activity would be more likely to disturb breeding birds. Maintenance of the proposed pipeline would be less likely to disturb nesting eagles. However, depending on the specific maintenance activity (e.g., excavation, vegetation clearing, dangerous tree removal) and its timing, it could have some negative impacts to breeding eagles.

GSX-Canada

No site-specific impacts to nesting or breeding eagles were identified in the GSX-Canada studies (GSX-Canada, Volume 4, Section 7, pg. 89. April 2001).

Terasen Gas Alternative

No information on potential impacts to bald eagles of the Terasen Gas Alternative is available.

No Action Alternative

No information on potential impacts to bald eagles of the NorskeCanada proposal is available.

Mitigation Measures

GSX-US

WDFW's California Creek Bald Eagle Management Plan imposes the following conditions to protect the California Creek bald eagle territory:

- No excavation within 50 feet of the nest tree.
- No tree removal within 100 feet of the nest tree.
- All material removed for the trench and piled during pipe installation will be used to refill the trench and/or be spread on adjacent fields and will not remain piled within 50 feet of the nest tree.
- A report from a certified arborist, indicating the health of a danger tree and the need to remove the tree, shall be submitted to WDFW prior to cutting of a danger tree.
- Timing restrictions are strongly recommended for the area within 400 feet of the active nest, but not required.

In addition, mitigation measures on page 3-98 of the FERC Final EIS and FERC Condition 26 in the Final EIS call for pre-construction bald eagle surveys to be conducted by GSX-US according to protocols determined by USFWS and WDFW. The purpose of the surveys would be to determine if any new bald eagle nests have been established in the project vicinity, and that GSX-US would adhere to conditions in the habitat management plan.

A letter from the USFWS to FERC June of 2002 concurs with the GSX-US's determination of "may affect, not likely to adversely affect" for bald eagles. This concurrence is based on the assumption that all activities within 0.25 miles of active bald eagle nest sites that exceed ambient noise or disturbance levels would be restricted between August 15 and January 1 (i.e., the open construction window). In addition, the letter states that concurrence is based on the fact that "the project will not remove suitable habitat for listed terrestrial species", which includes bald eagles. Therefore, the proposed project is expected to avoid construction and operation activities within 0.25 miles of the California Creek nest territory between January 1 and August 15, and would not remove potential perch trees from the forested stand adjacent to Bertrand Creek (USFWS 2002).

GSX-Canada

No mitigation measures specific to bald eagles were included in GSX-Canada's environmental assessment. However, the document contained a number of general measures designed to minimize habitat disruption. The pipeline route was selected to avoid bisecting unfragmented forest interiors, to traverse agricultural land and existing clearings, as well as to follow existing rights-of-way and previous disturbances where practical. Where feasible, nests, dens, and breeding sites (e.g., nesting trees) for species of concern identified during the wildlife inventory and effect assessment prior to construction would be avoided by either realigning the pipeline right-of-way or by fencing an exclusion area during construction. Pre-clearing would be conducted in advance of peak timing for breeding migratory bird nesting (April 1 to July 31) if other critical scheduling elements permit. Where a conflict occurs between engineering requirements and confirmed sites, regional biologists would be consulted regarding the possibility of moving or reestablishing the site or appropriate compensation for the loss of the site (e.g., nest boxes for certain species). In the event that a listed species or species of concern is discovered during construction, the particular circumstance will be evaluated in consultation with provincial and federal resource agencies to determine the most appropriate course of action (GSX-Canada, Volume 4, Section 7, pg. 89. April 2001).

Terasen Gas Alternative

No information on potential impacts to bald eagles of the Terasen Gas Alternative is available.

No Action Alternative

No information on potential impacts to bald eagles of the NorskeCanada proposal is available.

Significant Unavoidable Adverse Impacts

If GSX-US adheres to the mitigation measures listed above, no significant unavoidable adverse impacts to breeding, roosting or foraging bald eagles would be expected.

3.5.10 Issue 9

Issue Summary

Description of Problem

Assumptions regarding temporary forest habitat impacts are incorrect and forest fragmentation effects on wildlife are not quantified. On page 3-57 of the Final EIS, no discussion is provided of how many forested stands crossed by the pipeline are of significant size and thus could potentially have interior forest habitat. Data are presented in Appendix K of the Final EIS. However, that appendix does not specify the size of the forested stands. Many of them are simply listed as ">5" acres in size.

Ecology Requirement

Include data, a map, and discussion on what forested stands of significant size (if any) are fragmented in the environmental analysis.

Affected Environment

GSX-US

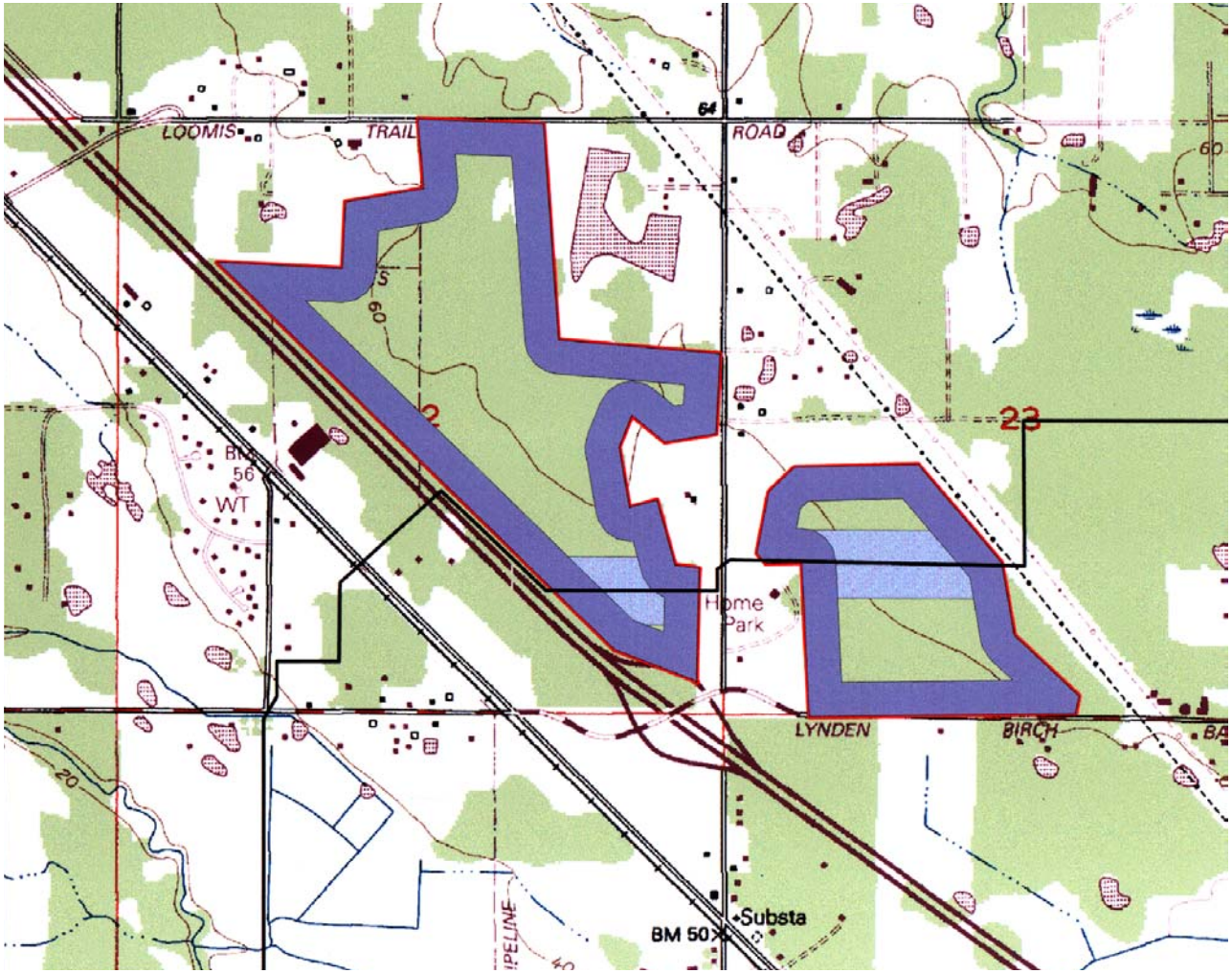
Based on a review of the most recent project maps, as well as aerial photographs of the project alignment and project vicinity, two large and relatively contiguous forested stands were identified that would be fragmented by the proposed pipeline right-of-way. These two stands are located between MP 23.5 and Interstate 5 and are shown in Figure 3.5-3. There is another stretch of forested habitat between MP 22.4 and MP 23.5. However, this forested area is significantly fragmented by rural residential homes, clearcuts, and roads. The two impacted stands are a combination of upland and wetland mixed deciduous/conifer forests. Page 3-57 of the FERC Final EIS states that the "loss of forest habitat and the creation of open early successional and induced edge habitats in these woodlots could decrease the quality of habitat for forest interior species for distances up to 300 feet from the right-of-way". Accordingly, 300 feet was used as the threshold between edge and interior forest habitat. Based on this criterion, the two stands shown in Figure 3.5-3 currently have approximately 100 and 43 acres, respectively, of interior forest habitat.

GSX-Canada

In the first 8 miles from landfall of the onshore corridor, the majority of forests have regenerated after turn-of-the-century logging. The coastal variety of Douglas fir is the most common species in upland forests with western red cedar, grand fir, arbutus, Garry oak, and red alder frequently associated. Less common trees include shore pine, Sitka spruce, western hemlock, bitter cherry, western flowering dogwood, bigleaf maple, black cottonwood, and trembling aspen.

In the remaining 7 miles of the onshore corridor, characteristic features are the prominence of western hemlock along with a substantial component of Douglas fir along and western red cedar. Grand fir, western white pine and bigleaf maple occur in warmer and drier, southern parts of the area. Red alder is widespread on logged or otherwise disturbed sites. Sitka spruce is also common in the south part of the area, particularly on specialized habits such as floodplains and exposed beaches (GSX-Canada, Volume 4, Section 5, pg. 20. April 2001).

Graphics Server/Graphics/Billable/GSX/Fig 3.5-3 forest stands 9.15.03



0 1500'

Approximate Scale in Feet

existing edge habitat

edge habitat with proposed route

large fragmented forest stands

FIGURE 3.5-3

FOREST STANDS SUBJECT TO FRAGMENTATION

GEORGIA STRAIT CROSSING PROJECT

1034001

SHAPIRO & ASSOCIATES, INC.

Impacts

GSX-US

The proposed pipeline right-of-way would convert from 6 to 15 acres of the two forested stands. This fragmentation would be located in lower end of the larger stand, which minimizes overall impacts to the stand. The second stand is largely bisected by the proposed right-of-way, which will effectively eliminate interior forest habitat in that stand. However, this stand has experienced logging in the last ten years (based on aerial photographs), which has thinned a portion of the center of the stand and reducing the quality of interior habitat.

GSX-Canada

The clearing of pipeline right-of-way may alter the interiors of some forested communities through the introduction of an edge effect. The edge effect represents changes in vegetation that extend beyond the boundary of a forest ecosystem following the clearing of adjacent forest habitat and subsequent changes to the forest environment. Wind velocity is generally higher at forest edges, increasing the potential for tree damage caused by windthrow at or near the edge. In addition, edges have the potential to serve as corridors for the invasion of exotic species into previously unaffected areas (GSX-Canada, Volume 4, Section 7, pg. 77. April 2001).

Terasen Gas Alternative

No specific information on affected forested areas is available for the Terasen Gas Alternative.

No Action Alternative

No specific information on affected forested areas is available for the NorskeCanada proposal.

Mitigation Measures

GSX-US

The current proposed alignment in this area minimized fragmentation impacts to the larger of the two forested stands. The Applicant has already made significant efforts to follow existing utility alignments. No further mitigation measures are recommended to offset forest fragmentation impacts.

GSX-Canada

Avoidance of significant communities such as old growth forests was an integral component in the routing strategy. Unfortunately, other routing criteria prevent complete avoidance. GSX-Canada efforts to minimize the direct loss of natural vegetation have reduced the overall magnitude by avoiding 4.3 acres of rare plant association, 1.8 acres of valued vegetation types and 9.6 acres of older forest habitat through route selection and refinement. In addition, numerous specimen trees were specifically avoided and the length of new edge reduced.

Few options are available to minimize edge effects. However, GSX-Canada has attempted, where feasible, to align the route on existing, or soon to be (i.e., prior to construction), cleared lands (approximately 2.4 miles), through revegetating cutblocks (approximately 0.4 miles) and along edges (approximately 2.8 miles) resulting in approximately 5.7 miles or 59% of the total terrestrial length crossing or following existing clearings. While routing along edges has some negative effect in that it shifts the edge effect deeper into forest habitats, it avoids bisection of habitat fragments, thereby retaining some of the fragments' interior forest characteristics.

Terasen Gas Alternative

No specific information on affected forested areas is available for the Terasen Gas Alternative.

No Action Alternative

No specific information on affected forested areas is available for the NorskeCanada proposal.

Significant Unavoidable Adverse Impacts

With the use of the proposed route and construction right-of-way, significant adverse impacts would not be expected.

3.5.11 Issue 10

Issue Summary

Description of Problem

Richardson et al. (1995) is cited repeatedly in the Final EIS as the source of information concerning marine mammals and their relationship to underwater noise. This citation is not in the list of literature cited. This is a significant oversight since almost all of the conclusions regarding the potential effects of noise produced by the offshore portion of the pipeline are based on this citation.

Ecology Requirement

Provide complete references for all citations in the environmental review.

Affected Environment

Add the following citation to the Literature Cited section:

Richardson, W.J., C.R. Greene, Jr., C.I. Malme and D.H. Thomson. 1995. Marine Mammals and Noise. Academic Press, San Diego, CA. 576 pp.

Impacts

Proposed Action

No additional analysis required.

Terasen Gas Alternative

No additional analysis required.

No Action Alternative

No additional analysis required.

Mitigation Measures

Proposed Action

No additional analysis required.

Terasen Gas Alternative

No additional analysis required.

No Action Alternative

No additional analysis required.

Significant Unavoidable Adverse Impacts

No additional analysis required.

3.6 RELIABILITY AND SAFETY

3.6.1 Applicable Sections in FERC Documents

Please refer to Section 3.13 in the FERC Final EIS and Resource Report 11, Reliability and Safety, in Exhibit F-1 of GSX-US's original application to FERC.

3.6.2 Issue 1

Issue Summary

Description of Problem

Pipeline protection measures need further discussion and clarification; emergency situation delay response time information is not adequate.

Ecology Requirement

Overall, protection measures need to be more specifically addressed. Discussion regarding management of the gas from valve to valve during an emergency is needed. Because of the history of pipeline safety in the region, protection and safety are issues of concern that need to be more fully addressed.

Affected Environment

No additional analysis required.

Impacts

Proposed Action

No additional analysis required.

Terasen Gas Alternative

No additional analysis required.

No Action Alternative

Impacts of proposed project would not occur.

Mitigation Measures

Proposed Action

GSX-US

The GSX-US pipeline would be designed, constructed, operated, and maintained in accordance with the federal Department of Transportation's *Minimum Federal Safety Standards* (49 CFR 192), which is the federal safety standard used in the transportation of natural gas. The following sections contain additional information to address the specific safety-related concerns expressed by Ecology.

Leak Detection: Leak detection is typically accomplished on natural gas transmission pipeline systems using a combination of regular ground and aerial surveillance, continuous monitoring of system flow parameters, and communications with landowners and tenants. These methods are considered to be sufficient under normal conditions. The unique characteristics of the marine pipeline portion of the GSX-US project present challenges that may not be adequately addressed by a normal application of these conventional leak detection methods. GSX-US is in the preliminary phases of designing a supervisory control and data acquisition (SCADA)-based leak detection system that would address some of the unique characteristics of the marine pipeline and would ultimately provide an increased level of safety and reliability.

The SCADA leak detection system would be based on a computer program that would continuously monitor the gas pressure, temperature, and volume of the system. The program would compare the actual pipeline throughput under current operating conditions with the throughput calculated by a system simulator. If the difference between the actual system throughput and the calculated system throughput exceeds a certain threshold, the program signals the discrepancy and further analysis would be required. It would then be necessary to determine if the cause of the imbalance is due to an actual leak or possibly other causes such as inaccurate transmitters or fluctuations in line conditions.

The system would be designed based on the specific parameters of the GSX-US pipeline with a minimum design detection limit of 10% loss of throughput in a 24-hour period. The system would be designed and initially installed using thresholds and parameters based on computer simulations. However, the actual system parameters would be finalized after the pipeline is in service and the system has been adjusted for actual operating conditions. Response times would depend on a number of factors related not only to the design of the system, but also to the nature of the situation. For example, very small leaks would be detected and identified over a greater time period than would larger leaks. The system would be designed such that larger leaks would be identified very quickly. If a leak were detected, system flow could be stopped immediately by remote operators from the gas control center or by local operations personnel.

The preliminary design suggests that the smallest leak that could be identified by the proposed leak detection system would be about a 1-inch-diameter hole on the U.S. onshore pipeline or about a 1/8-inch-diameter hole on the marine pipeline (difference is due to higher pressures on

marine pipeline), either case being equal to about 1% of the total throughput of the GSX-US system.

The leak detection system would be monitored 24 hours a day, 7 days a week, 365 days a year at the gas control center in Salt Lake City, Utah. The system would provide continuous information to the control center operators, and would have appropriate threshold and alarm values set such that warnings would be provided to the operators when critical parameters are exceeded.

Many other parameters on the GSX-US system (separate from the leak detection system) also would be monitored by the control center and by field personnel that would assist in the evaluation of system changes and potential leaks. For instance, if a major disruption in flow occurred, it would be identified almost immediately in the control center through monitoring systems separate from the leak detection system.

Integrity Evaluation: The GSX pipeline would apply a Risk Management Process (RMP) as part of a systematic and comprehensive Integrity Management Plan to reduce the risk of pipeline failure and the resulting consequences related to a failure. The process would integrate information from various sources such as a geographic information system (GIS), cathodic protection data, and in-line inspections to better identify and analyze the threats to the integrity of the pipeline. Through a formal and detailed ranking process, projects and activities would be identified to mitigate potential system integrity threats, thereby reducing the likelihood of failure. In addition, the RMP would examine the consequence of potential releases and explore opportunities to minimize impacts on public safety, health, business, and the environment.

The process would also include the use of an Integrity Assessment Program (IAP) that includes a database of all risk factors to the pipeline. The data would include soil data, depth of cover, geologic hazards, pipe data, appurtenance data, operating data, third party damage factors, and population density. The program would analyze the data to determine risk levels for different segments of the system. This information would be used to assist in determining appropriate maintenance activities, areas that require additional measures, or other integrity evaluation activities. This program would assist in determining appropriate intervals for internal inspections, close interval surveys, and other monitoring.

Check Valves: Check valves are devices used in pipelines for restricting flow to one direction. They are most often used at locations where pipelines connect to another pipeline (either a supply source or a delivery point) known as “interconnections.” On the GSX-US pipeline, check valves are proposed at interconnections. Check valves used elsewhere along the pipeline would add no real value and would not increase the safety or reliability of the system. There are three proposed interconnections on the GSX-US system. Two proposed interconnections, one to the existing Westcoast system and one to the existing Northwest Pipeline system, are located at Sumas, Wash. A check valve would be installed at both interconnects. The check valve would only allow gas flow into the GSX-US system and would prevent the backflow of gas from GSX-US into either the Westcoast or the Northwest system. The third interconnection would be located on Vancouver Island to connect GSX-US with the TGVI pipeline. A check valve would be installed at the Terasen Gas interconnection and would only allow gas flow from the GSX-US

pipeline to the Terasen Gas system and would prevent backflow. Check valves are used for operational and business-related reasons rather than for safety.

Mainline Valves: Mainline block valves are proposed on the GSX-US pipeline in six locations as follows:

- MP 0.0 (Sumas interconnection site)
- MP 7.6
- MP 15.1
- MP 19.8
- MP 26.3
- MP 32 (Cherry Point compression site)

These valves would be used to stop the flow of gas and to isolate smaller sections of the pipeline. With the exception of the valves at Cherry Point and Sumas, local operations personnel must physically operate the valves. The valves at Cherry Point and Sumas could be closed by remote operators from the gas control center in Salt Lake City or by local operations personnel.

In addition to the valves listed, three valves exist in Canada, including one immediately downstream of where the pipeline comes onshore onto Vancouver Island. This valve could be remotely closed from the gas control center, and along with the valve at Cherry Point would allow the isolation (remote if necessary) of the entire marine section of the pipeline. Spacing between the valves would conform to Class 3 criteria even though the entire GSX-US route is Class 1 or Class 2 at this time.

All mainline block valves would be equipped with blowdowns on both sides of the valve. The blowdowns consist of an aboveground riser or pipe segment and a valve. In case of emergency or for certain maintenance activities, the appropriate pipeline segment could be isolated by closing the nearest valve on both ends of the segment. Any remaining gas would then be safely vented to the atmosphere through the blowdowns.

Staff Training: Williams Pipeline personnel at the Sumas, Washington, district office would operate and maintain the U.S. portion of GSX. While additional personnel may need to be added to cover the additional work, existing staff would be involved in the critical aspects of operating and maintaining the GSX-US system. Williams Pipeline would follow the training as outlined in its existing Operations and Maintenance Manual. Employees would be trained based on work activities. Employees must also pass operator qualifications for core competency skills. Refresher training would be conducted as needed. Employees would participate in health and safety training during district employee meetings. The training employees receive would be documented in a computer-based management system.

Third-Party Damage Prevention: Williams Pipeline performs numerous activities and uses a variety of tools to protect its assets and the public from third-party damage. Those activities include the following:

- Weekly aerial surveys, weather permitting, to view any activity along the right-of-way.
- Flyers, letters, brochures, and documents sent to landowners to remind them of the pipeline and its location and to notify Williams Pipeline Company of any activity along the right-of-way.
- Public education policy and procedure.
- Mutual assistance with local public officials and related operators.
- Policy and procedure to protect facilities from vandalism, terrorists, criminal activity, and similar threats.
- Continuing documented surveillance to monitor changes in class location.
- Leak surveys (without leak detection equipment) at intervals not exceeding 15 months, but at least once each calendar year.
- Leak surveys (with leak detection equipment) in Class 3 locations at intervals not exceeding 7.5 months, but at least twice each calendar year.
- Installing and maintaining line markers.
- Keeping right-of-way cleared and visible.

Washington Utilities and Transportation Commission Issues (Comments on Draft EIS): The Washington Utilities and Transportation Commission (WUTC) serves as an agent for the Department of Transportation's Office of Pipeline Safety (OPS) primarily to inspect pipelines for compliance with 49 CFR 192. In letters from the OPS to FERC and from the WUTC to FERC, it was made clear that the WUTC's comments on the Draft EIS were made in the commission's role as an intervenor and not as an agent for the OPS. It is worth noting, as pointed out by the OPS, that several of the technical comments contained in the WUTC correspondence address matters that vary from the requirements of the applicable portions of 49 CFR 192.

As requested by Ecology, GSX-US is providing the following information to assist in understanding and/or clarifying the issues raised by the WUTC as they relate to federal safety standards. WUTC comments on the Draft EIS and the FERC's responses to those are contained in Appendix O of the Final EIS.

- The WUTC recommends the GSX-US pipeline be odorized for public safety. As mentioned in the FERC's comments to the WUTC (Final EIS Appendix O, SA1-2), there is no Department of Transportation requirement to odorize an interstate transmission pipeline in Class 1 or Class 2 locations. As previously discussed, GSX-US would install a leak detection system and would conduct leakage surveys on a regular basis.
- The WUTC recommends the following: (1) Prior to commissioning of the pipeline, provide an internal inspection survey (smart pig) to identify construction anomalies and establish a baseline for future evaluations; (2) Future smart pig internal inspections should be done at approximately 5-year intervals to identify wall loss from corrosion and third-party excavation damage; (3) A schedule should be established for excavating anomalies that require field inspection and remediation defects that require repair; and (4) Use the data obtained from the internal inspection to perform a risk integrity assessment of the pipeline to determine the appropriate frequency of internal inspections. See the FERC's response to the WUTC (Final EIS Appendix O, SA1-5) and the discussion above under the heading "Integrity Evaluation." GSX-US is also proposing to run an in-line inspection caliper pig to identify any construction anomalies and serve as a baseline for future reference.

GSX-Canada

In case of emergency, GSX-Canada would invoke its Emergency Preparedness and Response Program (EPR). GSX-Canada stated that its EPR would fulfill the requirements of the NEB and the U.S. Occupational Safety and Health Act. The EPR would include the following components:

- Program Development (Hazard Assessment)
- Emergency Procedures Manual
- Liaison Program (First Responders)
- Continuing Public Education Program
- Emergency Response Training
- Emergency Response Exercises
- Incident and Response Evaluation
- Emergency Response Equipment

In its July 2003 ruling, the Joint Review Panel concluded that GSX-Canada had taken an acceptable approach in identifying and assessing hazards associated with the project. The panel further concluded that GSX-Canada had designed the terrestrial section of the pipeline for a Class 3 designation, which meets or exceeds the requirements of current regulations. With these mitigation measures in place, the panel concluded that significant adverse environmental impacts from accidents and malfunctions would be unlikely.

Terasen Gas Alternative

Public safety at compressor stations will be ensured by fully enclosing these areas with a fence. In addition, construction will be in compliance with all building codes and will have the benefit of current safety practices. Each station will be remotely controlled with state of the art emergency reporting and shutdown equipment and will be monitored 24 hours per day from the Terasen Gas control center in Surrey, BC. TGVI has emergency response procedures to effectively deal with emergencies related to compressor facilities and the pipeline.

LNG facilities have a proven public safety record. No LNG accidents have affected the general public in North America in the last 55 years. Hundreds of such facilities, constructed to rigorous design codes, are safely operating in North America and elsewhere in the world. Terasen Gas's existing Tilbury LNG facility has operated safely without incident since being placed into operation in 1970.

No Action Alternative

All of the NorskeCanada mills have strong safety records focusing on prevention and planning. Appropriate management will be exercised around the operation of the cogeneration facility, the aqueous ammonia storage facilities, and the natural gas supply. Dedicated mill emergency response teams are currently trained in the handling of problems related to this type of infrastructure.

Significant Unavoidable Adverse Impacts

No additional analysis required.

3.7 LAND AND SHORELINE USE

3.7.1 Applicable Sections in FERC Document

Please refer to Section 3.9 in the FERC Final EIS and Resource Report 7, Soils, and Resource Report 8, Land Use, Recreation, and Visual Resources, in Exhibit F-1 of GSX-US's original application to FERC.

3.7.2 Issue 1

Issue Summary

Description of Problem

The FERC Final EIS does not include a summary of existing land use plans, shoreline plans, or zoning regulations applicable to the proposal, nor does it include a discussion of whether the proposal is consistent or inconsistent with these plans and regulations.

Ecology Requirement

Include an analysis of the proposal's consistency with adopted land use and shoreline plans and regulations in the environmental review.

Affected Environment

No additional analysis required.

Impacts

Proposed Action

No additional analysis required. Refer to discussion of consistency with land use plans and policies below.

Terasen Gas Alternative

Approximately 30 acres would be converted for use for the three compressor stations. Each station would require approximately 10 acres, with 7 acres requiring clearing. Most of the pipeline looping on 45.3 miles of existing Terasen Gas pipeline would be constructed within existing pipeline right-of-way. The LNG facility would require an operational area of 10 acres, with a minimum 300-acre protective buffer surrounding the site.

No Action Alternative

Impacts of the proposed project would not occur.

Consistency with Plans and Policies

The purpose of this section is to evaluate the consistency of the GSX-US project with adopted land use plans, policies, and regulations. A summary of the key elements of each plan, policy, or regulation is provided and followed by an analysis of consistency with the proposal. No equivalent consistency analysis was conducted for the GSX-Canada portion of the project.

State of Washington

Clean Water Act Implementation

Water quality regulations are mandated by the federal Clean Water Act (Water Pollution Control Act). RCW 90.48 is the primary water pollution law for the state of Washington. Under state statute, discharge of pollutants into waters of the state is prohibited unless authorized. WAC 173-201A mandates water quality standards for surface waters. Ecology issues a Section 401 certificate of water quality compliance for each Clean Water Act Section 404 permit. Ecology also has the authority to issue administrative orders for projects not requiring 404 permits. Ecology administers requirements under Clean Water Act Section 402 through its National Pollutant Discharge Elimination System (NPDES) individual and general permits.

Coastal Zone Management Act

The Coastal Zone Management (CZM) Act of 1972 was enacted to encourage advancement of national coastal management objectives and help states develop and implement management programs. Washington's CZM Program has been approved by the National Oceanic and Atmospheric Administration and is administered by Ecology.

When applying for federal permits, such as a U.S. Coast Guard or U.S. Army Corps of Engineers Section 401 and 404 permit, for a project in one of the 15 coastal counties, project applicants must certify that the requirements of the state's CZM Program have been met (Shoreline Management Act, RCW 90.58). For a proposal to be consistent with the CZM Program, it must meet the requirements of SEPA, the Shoreline Management Act, federal and state clean water acts, and federal and state clean air acts. Ecology reviews proposed projects for consistency with the above laws. The CZM Certification of Consistency with Washington's Coastal Zone Management Program for Federally Licensed or Permitted Activities is a checklist that provides the necessary information to assure federal consistency.

Shoreline Management Act

The goal of Washington's SMA (RCW 90.58) is "to prevent the inherent harm in an uncoordinated and piecemeal development of the state's shorelines." The act establishes a broad policy of shoreline protection, which includes water quality. The SMA uses a combination of policies, comprehensive planning, and zoning to create a special zoning code overlay for shorelines. Under the SMA, each city and county can adopt a shoreline master program that is based on state guidelines but tailored to the specific geographic, economic, and environmental

needs of the community. Master programs provide policies and regulations that address shoreline use and protection as well as a permit system for administering the program.

On May 2, 2001, GSX-US submitted a Certification of Consistency with the Washington CZM Program to Ecology. GSX-US proposes to implement several measures to ensure consistency with the CZM Program as described below.

- The landfall near Cherry Point would be crossed using the HDD construction method. The drill entry point would be located about 1,000 feet inward of the top of the coastal bluff, ensuring pipeline protection from bluff erosion. The exit point would be about 2,200 feet offshore, avoiding direct disturbance to the coastal bluff and nearshore environment.
- From the HDD exit point to a water depth of about 240 feet, the pipe would be buried in the seabed at a depth equivalent to the pipe's diameter to protect against significant ecological impacts (e.g., crab movement or substrate alteration).
- Stream reaches designated as shorelines would be crossed using the HDD construction method.
- Geotechnical investigations have indicated a high probability of success for all HDD crossings.
- SMP policies and regulations of Whatcom and San Juan counties would be followed.
- Streams and wetlands would be crossed using FERC procedures (with specified variances discussed in Section 3.4.2.3 of the Final EIS) and enforceable policies of the U.S. Corps of Engineers and Ecology.
- GSX-US would implement the FERC plan (with specified variances discussed in Section 3.2.1 of the Final EIS) to control erosion and sedimentation from construction activities. Additionally, GSX-US would comply with enforceable policies of state and county programs addressing groundwater controls.
- Onshore and offshore Spill Prevention Control and Countermeasures (SPCC) Plans have been prepared to minimize spill potential and consequences of a spill, which are currently under review by Ecology.
- Operation of the proposed Cherry Point compressor station would be in compliance with state air quality requirements.
- Pipeline facilities would be designed and located to minimize impact on shoreline functions, preserve the natural landscape, and minimize conflicts with present and planned land and shoreline uses.
- The proposed pipeline facilities would be located adjacent to existing rights-of-way and utility corridors for about 73% of the onshore length.

Whatcom County

The entire onshore portion of the proposed project and the majority of the offshore portion are located in Whatcom County. Whatcom County has several plans and/or ordinances in place to guide and direct growth within the county including a Comprehensive Plan, Critical Areas Ordinance, and SMP. The county also developed natural gas and hazardous liquid pipeline siting criteria in October 2001 that can be used to identify utility corridors best suited to these types of pipeline projects.

Comprehensive Plan

The Washington State Legislature adopted growth management legislation in 1990 and 1991 and in most years since then. The 1990 Growth Management Act (GMA), RCW 36.70A.070, sets goals to guide planning in the larger, fastest growing counties and cities within those counties. The Whatcom County Comprehensive Plan was reviewed for consistency with the requirements of the GMA and the 13 stated goals of the GMA's mandatory plan elements.

The Whatcom County Comprehensive Plan is intended to guide growth in unincorporated areas of the county for the next 20 years in coordination with the plans of its incorporated cities. The fundamental purpose of the Comprehensive Plan is "to establish a framework of goals, policies, and action items for the more detailed growth planning and implementation actions which will occur in the near future in designated unincorporated urban growth areas in the county's rural areas" (Whatcom County 1997).

The Comprehensive Plan identifies Urban Growth Areas (UGAs) and contains a future land use map. The majority of the county's growth is expected to be within the UGAs (Whatcom County 1997). Of the UGAs identified in the plan, the GSX-US pipeline route crosses only the Cherry Point Major Port/Industrial UGA. The land within this UGA has been planned and designated by Whatcom County for industrial development and is currently the site of three major industrial facilities including two oil refineries and an aluminum smelter. According to the Whatcom County Comprehensive Plan, the goal of the Cherry Point UGA is to maintain the area as an unincorporated UGA based on its unique location and characteristics and its significant contribution to the overall industrial land supply and Whatcom County's tax base. GSX-US's proposed route would be within the Cherry Point UGA between MPs 29.3 and 33.1. The proposed Cherry Point compressor station would also be located within the Cherry Point UGA. The placement of these facilities within the Cherry Point Major Port/Industrial UGA is consistent with the intended use of this UGA.

Shoreline Management Program

The Whatcom County SMP was originally adopted in May 1976 with subsequent Ecology approval in August 1976. Several amendments have been adopted since 1976. The Whatcom County SMP was developed to fulfill the requirements of the SMA. The overall goal of the SMP is to achieve rational, balanced, and responsible use of Whatcom County's shorelines (Whatcom County 1998).

Shorelines are defined as "all of the water areas of the State, including reservoirs and their associated wetlands, together with lands underlying them; except: a) shorelines of statewide significance; b) shorelines on segments of streams upstream of a point where the mean annual flow is 20 cubic feet per second or less and the wetlands associated with such upstream segments; and c) shorelines on lakes less than 20 acres in size and wetlands associated with such small lakes" (Whatcom County 1998).

The onshore portion of the GSX-US project would cross four streams with reaches designated as shorelines (Saar Creek, Sumas River, Fishtrap Creek, and Bertrand Creek). The SMP defines

these shorelines as "rural." A rural shoreline means "an area developed at a low overall density or used at a low to moderate intensity; including, but not limited to: residences, agriculture, and outdoor recreation developments" (Whatcom County 1998). Pipeline facilities crossing these four streams including shorelands extending 200 feet either side of the ordinary high water mark (OHWM) would require approval under the SMP. GSX-US proposes to use the HDD or conventional bore construction method to mitigate potential impact on these designated shorelines.

The entire marine portion of the proposed route in Whatcom County is designated as a shoreline of statewide significance. Shorelines of statewide significance include all marine waters, water columns, and bedlands seaward of extreme low tide (Whatcom County 1998). Policies for shorelines of statewide significance include:

- The statewide interest should be recognized and protected over the local interest.
- The natural character should be preserved.
- Uses should result in long-term benefits to the people of the state.
- Resources and ecological systems should be protected.

The first 0.6-mile portion of the offshore route is within the Cherry Point Management Unit. The purpose of the Cherry Point Management Unit is to provide a regulatory environment that: (1) recognizes and balances the special port, industrial, and natural resource needs associated with the development of this marine resource along a shoreline of statewide significance, (2) identifies preferred development components of port and shore-dependent industrial activities consistent with the polices of the SMA, and (3) clearly sets forth the standards for such development (Whatcom County 1998). Three major industrial/port facilities are currently located in the Cherry Point Management Unit and a fourth facility is proposed. These facilities include the BP Cherry Point Refinery/Pier (including a pier extension constructed in 2000 and 2001), Alcoa Intalco Aluminum Works/Pier, TOSCO Ferndale Refinery/Pier, and the proposed Gateway Pacific Terminal. This area overlaps with the Cherry Point State Aquatic Reserve. GSX-US proposes to use the HDD construction method to mitigate potential impact on this area.

The SMP designates the remaining portion of the offshore route in Whatcom County as "aquatic." Aquatic shorelines are, "the area waterward of the OHWM of all streams, all rivers of statewide significance, all marine water bodies, and all lakes, together with their underlying lands and their water column; including but not limited to bays, straits, harbor areas, waterways, coves, estuaries, streamways, tidelands, bedlands, wetlands, and shorelands" (Whatcom County 1998). The pipeline in these areas would be buried in the seabed at a depth equivalent to the pipe's diameter in -240 feet MLLW to mitigate significant ecological impacts (e.g., crab movement or substrate alteration).

In its Certification of Consistency with the Washington State CZM Program and its application for Shoreline Permit to Whatcom County (June 2001 revised Nov. 2001 and January 2002), GSX-US stated that it would comply with the policies and regulations set forth in the Whatcom County SMP.

Critical Areas Ordinance

Whatcom County has identified lands and waters within the county as critical areas to comply with the GMA (Whatcom County 1997). As defined by RCW 36.70A.030(5) and Whatcom County Code 16.16.800(17), critical areas include geologically hazardous areas, alluvial fan hazard areas, frequently flooded areas, critical aquifer recharge areas, wetlands, and fish and wildlife conservation areas. These areas are defined by the Whatcom County Critical Areas Ordinance and described below.

Geologically Hazardous Areas: Geologically hazardous areas include landslide hazard, seismic hazard, and mine areas. The coastal bluff at the Cherry Point landfall exceeds 35% slope, thereby meeting the definition of a landslide hazard area. GSX-US proposes to install the pipeline in this area using the HDD construction method, which would avoid the coastal bluff. The HDD entry point would be about 900 feet east of the top edge of the coastal bluff.

Alluvial Fan Hazard Areas: Alluvial fan hazard areas include those areas on alluvial fans where flooding and/or debris torrents have the potential to damage or harm the health or welfare of the community. They include the area generally corresponding to the path of recent and potential future stream flooding and/or debris torrents as determined by local topography, hydrology, and depositional history on the fan. No active alluvial fans have been identified on the GSX-US route or aboveground facility sites.

Frequently Flooded Areas: Areas included in this category are subject to a 1% recurrence interval of flooding or a 100-year base flood as mapped by the Federal Emergency Management Agency's Flood Insurance Rate Maps as amended for Whatcom County. Such areas are located along major rivers, streams, and coastal areas where the depth, velocity, intensity, and frequency of flooding during major events are of such a magnitude that risk to human life and property improvements may occur. Subsurface pipelines are allowed uses in floodplains that include the Sumas River, Saar Creek, and Bertrand Creek.

Critical Aquifer Recharge Areas: This includes areas of high susceptibility to aquifer contamination as follows:

- The project is located on either Natural Resource Conservation Service hydrologic soil group A or B.
- The project is located on either the Sumas outwash geological unit or the Nooksack River floodplain alluvium geological unit.
- More than 50% of the documented well logs within 0.5 mile of the project indicate a static water level of less than 50 feet below the ground surface as indicated by the most recent well log.
- The project is located on a subsurface above the first occurrence of water that consists of highly permeable materials that are unobstructed by poorly permeable strata.

The majority of the proposed GSX-US route is located within critical aquifer recharge areas.

Wetlands: Wetlands are those areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support and, that under normal circumstances, do support a prevalence of vegetation typically adapted for life in saturated soil conditions.

Non-regulated wetlands as defined by the Whatcom County Critical Areas Ordinance include:

- Areas in which wetlands were created by activity, intentional or unintentional, other than mitigation after July 1, 1990.
- Isolated wetlands less than 1/3 acre in size.
- Any wetland hydrologically isolated with vegetation dominated by invasive species or pasture grasses, the dominant functions of which are restricted to stormwater storage/flood attenuation, and the functions are no greater than all alternative non-wetlands sites on the parcel of property in question.

All other wetlands are considered regulated wetlands. Wetlands associated with the GSX project are presented in the Final EIS.

Fish and Wildlife Conservation Areas: Fish and Wildlife Habitat Conservation Areas include:

- Areas where listed species have a primary association.
- Habitats and species of local importance.
- Shellfish habitat conservation areas.
- Kelp and eelgrass beds, Pacific herring spawning areas.
- Ponds and wetlands.
- Lakes and marine waterbodies.
- Rivers and streams.
- Natural area preserves.

Two riparian areas, the Nooksack River corridor and the Terrell Creek corridor, were specifically identified as critical areas.

Utility Corridor Planning

In October 2001, Whatcom County completed the siting criteria for natural gas and hazardous liquid pipelines indicating a preference for locating these facilities in existing utility corridors. According to Whatcom County, the purpose or function of utility corridors is to provide some level of predictability to both the general public and to the pipeline industry about the current and future routing of pipelines within the county.

Several locational factors are being considered during the development of siting criteria and the location of corridors. Some of these factors include:

- Distance to schools, high occupancy public facilities, high density residential development, medium density residential development, low density residential development, rural designated land, and areas of more intense rural development.

- Location within designated agricultural, forested, or mineral resource lands (as defined by the Comprehensive Plan).
- Average distance to existing residential structures.
- Location within an existing pipeline right-of-way, preferred county transmission corridor, or within a shared corridor.
- Location of sensitive areas defined in the Critical Areas Ordinance (i.e., wetlands, aquifer recharge areas, frequently flooded areas, geologically hazardous areas, and fish and wildlife habitat conservation areas).
- Acres of designated shoreline to be affected.
- Location of cultural/archeological resources.

The onshore pipeline route would be in or adjacent to various existing rights-of-way/corridors for about 73% of the onshore route. The Whatcom County Utilities Planning and Advisory Committee used the GSX onshore pipeline route as a test case for the siting criteria. That review resulted in a favorable conclusion by the Utilities Planning and Advisory Committee.

Whatcom County has recognized that federal regulations and case law on permitting interstate pipeline facilities may preempt state and local governments. This fact was further acknowledged within an internal communication from the County Prosecutor's office to the County Planner's office. GSX proposes to meet with the County Planner's office to discuss and potentially fund opportunities to ensure that local land use requirements are not compromised or violated.

San Juan County

About 3.7 miles of the offshore portion of the GSX-US project is located in San Juan County. San Juan County has a Comprehensive Plan and Unified Development Code in place to guide and direct growth and development within the county. San Juan County's Shoreline Master Program is incorporated in both the Comprehensive Plan and the Unified Development Code.

Comprehensive Plan

As with Whatcom County, San Juan County's Comprehensive Plan was developed in response to the Washington GMA. San Juan County's Comprehensive Plan is "a guide for the physical, economic, and community development of the county for the next twenty years" (San Juan County 1998). The Comprehensive Plan uses a land classification system to identify different types of land use districts based on the goals and policies of the Comprehensive Plan. Although the GSX-US project would not cross any land surface within San Juan County, one of the elements included in the Comprehensive Plan is San Juan County's SMP. This element of the Comprehensive Plan is part of the SMP while the shoreline use regulations that implement the goals and policies of the SMP are contained in San Juan County's Unified Development Code.

Shoreline Master Program

San Juan County's SMP was developed to fulfill the requirements of the SMA. The intent of the SMP is to manage the use and development of the shorelines of San Juan County, giving

preference to water-dependent and water-related uses and to encourage that shoreline development and use occurs in harmony with natural conditions (San Juan County 2000).

As with Whatcom County, marine waters within San Juan County are designated shorelines of statewide significance. This designation would apply to the entire portion of the proposed route in San Juan County. San Juan County's policies for managing shorelines of statewide significance include:

- Recognize and protect the statewide interest over the local interest.
- Preserve the natural character.
- Use in ways that will produce long-term benefits as opposed to short-term benefits or conveniences in accordance with the following:
  - Actions that would commit resources to irreversible uses or would detrimentally alter natural conditions characteristic of such shorelines should be severely limited.
  - The short-term economic gain or convenience associated with a proposed development should be evaluated in relationship to long term and potentially costly impairments to the natural environment.
  - The visual impact of every proposed project should be thoroughly evaluated and adverse impacts should be minimized.
- Protect the natural resources and systems. Areas containing unusual or fragile natural resources or systems should be left undeveloped.
- Increase public access to publicly owned areas.
- Increase recreational opportunities for the public.

The county's SMP designates the marine waters of San Juan County as "aquatic." The purpose of the aquatic environment is to protect the quality and quantity of the water, to preserve the water surfaces and foreshores for shoreline dependent uses, such as navigation, commercial fishing, recreation, water-dependent industry, marinas and aquaculture, and to preserve the aquatic area's natural features and resources (San Juan County 2000). Management polices for the aquatic environment include:

- Ensure that developments are compatible with the adjoining upland environment.
- Maintain the natural circulation and volume of water to the greatest extent possible.
- Prohibit structures that are not water-dependent.
- Prohibit activities and uses of a permanent nature that will substantially degrade the existing character or habitat value of an area, unless the public interest clearly will be better served by approval of the proposed activity or use.
- Locate and design developments and activities using navigable waters or their beds to minimize interference with surface navigation, to minimize water quality impacts, to minimize adverse visual impacts, and to allow for the safe, unhindered passage of fish and animals.
- Protect fishing and recreational uses of the water, in appropriate areas, against competing uses that would substantially interfere with those activities.
- Encourage the joint use of structures that intrude into aquatic areas, such as docks, piers, jetties, breakwaters and bulkheads, etc., if the development is determined to be appropriate for the site and if adverse cumulative impacts can be mitigated by joint use.

- Prohibit motorized travel in land-based vehicles, provided that such travel should be permitted for official emergency vehicles, boat launchings, authorized construction and/or repair activities, and for aquaculture when specifically approved.

In its Certification of Consistency with the Washington State CZM Program and application for Shoreline Permit to San Juan County (June 2001), GSX-US stated that it would comply with the policies and regulations set forth in the San Juan County SMP.

Mitigation Measures

Proposed Action

No additional analysis required.

Terasen Gas Alternative

Permit applications for site acquisition, facility design, construction and operation will be made to the Oil and Gas Commission and the British Columbia Utilities Commission. Local governments will apply conditions of approval through the processes of rezoning, development, and other permits. On similar projects, TGVI has successfully addressed permitting issues and received all required approvals from local governments.

No Action Alternative

Because the new cogeneration facilities would be located at NorskeCanada's existing mill sites, no land use impacts have been identified.

Significant Unavoidable Adverse Impacts

No additional analysis required.

3.7.3 Issue 2

Issue Summary

Description of Problem

The Final EIS does not include a discussion of measures to mitigate the permanent conversion of agricultural land to utility uses, nor does it include discussion of the short-term or long-term impacts on agricultural crops as a result of project construction and operation.

Ecology Requirement

Include a discussion of measures to mitigate the permanent loss of agricultural land, and an analysis of the proposal's impacts on agricultural crops in the environmental review.

Affected Environment

No additional analysis required.

Impacts

Proposed Action

During the construction process, the GSX-US project would temporarily affect approximately 329 acres of agricultural land. Of that total, approximately 14 acres of hay meadow and pasture would be lost for the life of the project (Resource Report 5, pg. 5-8).

In the GSX-Canada project, 28.2 acres of agricultural land would be at least temporarily affected by pipeline construction. No estimate is available for the number of acres of agricultural land that may be permanently lost (GSX-Canada Application, Vol. IV, pg. 7-104).

Terasen Gas Alternative

Information on potential impacts of the Terasen Gas Alternative on agricultural lands is not available.

No Action Alternative

Information on potential impacts of the NorskeCanada proposal on agricultural lands is not available.

Mitigation Measures

Proposed Action

GSX-US would compensate farmers based on fair market value for both temporary and long-term losses of agricultural productivity (Resource Report 5, pg. 5-8). GSX-US would also adopt and implement the mitigation procedures outlined in the FERC Upland Erosion and Control, Revegetation and Maintenance Plan during project construction. GSX-US would salvage, store, protect, and respread topsoil to return agricultural lands to pre-construction productivity. Measures to restore disturbed areas would include relieving compaction, mulching, fertilizing, preparing the seedbed, and revegetation (Resource Report 7, pg. 7-7).

The GSX-Canada pipeline would be aligned where feasible to avoid agricultural lands. On those lands that would be affected, GSX-Canada would ensure a minimum depth of cover of 60 inches; in many cases, the depth of burial would be greater. GSX-Canada would ensure that all equipment is cleaned prior to starting construction in order to minimize the potential to import golden nematodes and noxious weeds (GSX-Canada Application pg. 7-103).

Terasen Gas Alternative

Because the nature and extent of potential impacts of the Terasen Gas Alternative on agricultural lands has not been identified, mitigation measures are not proposed.

No Action Alternative

Because the nature and extent of potential impacts of the NorskeCanada proposal on agricultural lands has not been identified, mitigation measures are not proposed.

Significant Unavoidable Adverse Impacts

With implementation of proposed mitigation measures, significant unavoidable adverse impacts would not be expected.

3.8 SOCIOECONOMIC CONDITIONS

3.8.1 Applicable Sections in FERC Documents

Please refer to Section 3.11 of the FERC Final EIS and Resource Report 5, Socioeconomics, in Exhibit F-1 of GSX-US's original application to FERC.

3.8.2 Issue 1

Issue Summary

Description of Problem

The FERC Final EIS does not provide references to support most statements of fact or conclusions in the discussions of population, economy, employment, housing, property values, and tax revenues. Without proper citations, it is not possible to verify the information provided.

Ecology Requirement

Include proper documentation for all data and information obtained from other sources in the SEPA Supplemental EIS.

Affected Environment

No additional analysis required.

Impacts

Proposed Action

Resource Report 5, Socioeconomics, contains the following list of references and contacts in support of the Final EIS findings and conclusions.

Data Book. 1999. San Juan County Profile. URL:
http://www.ofm.wa.gov/databook/county/sanj.htm.

Data Book. 1999. Whatcom County Profile. URL:
http://www.ofm.wa.gov/databook/county/what.htm.

Bellingham/Whatcom County Convention and Visitors Bureau. URL:
http://www.bellingham.org

San Juan Island Chamber of Commerce. 2000. URL: http://www.sanjuanisland.org.

TERA Environmental Consultants, Ltd. 2000. Environmental and socio-economic impact assessment for the Georgia Strait Crossing Project. Prepared for Georgia Strait Crossing Pipeline Limited, Vancouver, British Columbia.

U.S. Census Bureau Department of Commerce. 2000. General Population and Housing Characteristics: 1990. URL: http://www.factfinder.census.gov.

U.S. Census Bureau Department of Commerce. 2000. Occupancy, Tenure, and Age of Householder: 1990. URL: http://www.factfinder.census.gov.

Washington State Employment Security Department. 1999. San Juan County Profile. Labor Market and Economic Branch Report. URL: http://www.wa.gov/esd/lmea.

Washington State Employment Security Department. 1999. Whatcom County Profile. Labor Market and Economic Branch Report. URL: http://www.wa.gov/esd/lmea

Agencies and individuals contacted by GSX-US for the socioeconomic analysis are listed in the following table.

Table 3.8-1: Agencies Contacted for Socioeconomic Data

Agency	Contact	Title	Phone Number/Email	Regarding	Date
Whatcom County	Kalyn Gabriel	MLIS Webmaster	kgabriel@co.whatcom.wa.us	Social Services data	6-30-00
San Juan County Health and Community Services	John Manning	Director	johnm@co.san-juan.wa.us	Social Services data	6-30-00
Whatcom County Medical Society	Marilyn Miller	Executive Secretary	(360) 676-7630, MJMiller@hinet.org	Social services data	6-30-00
Whatcom County Labor Market Information	John Wines	Research Analyst 3	1-800-215-1617, Jwines@ESD.WA.GOV	Labor statistics	7-10-00

Terasen Gas Alternative

The construction of each of the three new compressor facilities would require approximately 6,000 person-days of work and employ approximately 30 contract personnel during peak construction. Local construction companies will benefit through subcontracts for some of the general construction work. The projects will also create secondary employment by generating the need for construction support and supply services.

For pipeline looping, a typical 12.4-mile loop provides approximately 27 person-years of employment. However, once operational, these loops will provide limited maintenance employment. It is anticipated that at least some of construction skills required for each loop should be available in the local labor market. The hiring of local workers would contribute to a modest, short-term improvement in employment levels, and generate several indirect and induced jobs in local economies.

Socioeconomic analyses for the LNG facility are not available.

No Action Alternative

Implementation of the NorskeCanada proposal could have significant local benefits resulting from the purchase of local goods and services, improvement in the economic competitiveness of the local economies, diversification of local economic activity, and protection of existing local jobs.

During the construction phase of the projects, there would be an estimated 500 person-years of onsite labor. Approximately $20 million would be spent on sourcing local services during construction, and an additional $20 million would be spent on engineering and consulting services in the BC lower mainland.

Mitigation Measures

Proposed Action

No additional analysis required.

Terasen Gas Alternative

No additional analysis required.

No Action Alternative

No additional analysis required.

Significant Unavoidable Adverse Impacts

No additional analysis required.

3.9 CULTURAL AND HISTORIC RESOURCES

3.9.1 Applicable Sections in FERC Documents

Please refer to Section 3.10 in the FERC Final EIS and Resource Report 4, Cultural Resources, in Exhibit F-1 of GSX-US's original application to FERC.

3.9.2 Issue 1

Issue Summary

Description of Problem

Eligibility status of prehistoric site 45WH536 is equivocal because the Final EIS states differences in opinion between the cultural resources contractor and Office of Archaeology and Historic Preservation (OAHP). If the site is eligible, what steps will be taken to protect it from adverse impacts? What are the results, if any, of the proposed survey of the remaining 4.3 miles of corridor? Moreover, what is the status of evaluation at the other two prehistoric sites and one historic site where landowner permission was being sought prior to testing?

Ecology Requirement

Clearly state the eligibility status of prehistoric site 45WH536 in the environmental review and, if it is eligible for listing on the National Register of Historic Places (NRHP), the steps to be taken to protect it from adverse impacts. Also, state in the environmental review whether a pedestrian survey was conducted and what the results were for the remaining 4.3 miles of pipeline corridor for which landowner permission was being sought. Determine eligibility status for the remaining two prehistoric sites and one historic site for which testing was recommended pending landowner permission.

Affected Environment

Although the National Register status of prehistoric sites 45WH536, 45WH535, and 45WH534, and historic site 37-15 have not been resolved, GSX-US will treat the sites as if they are eligible for listing and will attempt to avoid the resources. If avoidance is not feasible, GSX-US will consult with OAHP and affected Indian tribes to determine the sites' significance and formulate treatment plans.

GSX-US has surveyed segments of the pipeline corridor that were not assessed during the 1999 and 2000 work because of landowner refusals. Results of these surveys and OAHP concurrence should be included in this document when they are completed.

Impacts

Proposed Action

GSX-US

Based on the current design for the GSX-US project, cultural resources that may be eligible for listing in the National Register will be avoided. Therefore, no significant adverse impacts are expected. However, the results of additional archaeological surveys have not been compiled. The results of these studies may identify additional resources in the project area.

GSX-Canada

On the GSX-Canada project, the recent ruling by the NEB Joint Review Panel noted that a Heritage Resource Impact Assessment for the previously unsurveyed portions of the terrestrial route had not yet been completed. Therefore, GSX-Canada must file with the NEB for approval the results of that survey and proposed mitigation measures. The final Underwater Archaeological Assessment was also filed late in the process and had not been provided to the provincial authority responsible for archaeology. Therefore, GSX-Canada must file with the NEB for approval any comments and recommendations on the underwater assessment from the British Columbia Ministry of Sustainable Resource Management, Archaeology Branch.

GSX-Canada's assessment indicated that both the terrestrial and marine portions of the GSX-Canada route are currently used for traditional purposes, and include harvesting of marine resources, hunting and possibly plant harvesting. GSX-Canada reached an agreement on the concerns First Nations had previously expressed regarding their interests. The panel concluded that it is unlikely there will be significant adverse effects to the resources used for traditional purposes, and that it is also unlikely that the project would cause significant adverse effects to the current use of lands and resources for traditional purposes by aboriginal persons (National Energy Board 2003).

Terasen Gas Alternative

Terasen Gas has not undertaken any detailed analyses of potential impacts on cultural, archaeological, or historic resources resulting from its proposal. First Nation consultation is required as part of the Crown Land acquisition process and is considered a component of meeting the air emissions permit consultation requirements. Typically, the consultation process is comprised of three key components:

- Stakeholder and First Nations identification
- Project notification
- Communications activities

Typically, to complete these efforts the Applicant undertakes a public consultation process that includes public notices in local newspapers, open houses, mail outs and door-knocking campaigns as necessary to ensure that the public is aware of activities and is provided adequate

opportunity to comment. This process may take two to six months to complete. This consultation work would be documented and submitted in support of the BCUC approval processes. First Nation consultation is often an on-going process throughout the project (NorskeCanada 2003).

No Action Alternative

NorskeCanada has not undertaken any detailed analyses of potential impacts on cultural, archaeological, or historic resources resulting from its proposal. As with the Terasen Gas proposal, First Nation consultation is required as part of the Crown Land acquisition process and is considered a component of meeting the air emission permit consultation requirements.

Mitigation Measures

Proposed Action

Should the pipeline route change and make avoidance of cultural sites infeasible, GSX-US should consult with OAHP and affected Indian tribes. If the resources are determined to be National Register-eligible, a treatment plan should be devised.

Terasen Gas Alternative

As part of its ongoing operational strategy, TGVI has developed Memoranda of Understanding (MOUs) with most First Nations in its operational area. While these MOUs do not contain specific commitments, they reflect TGVI's general commitment to working with local First Nations to the betterment of both. TGVI will undertake all First Nation consultation necessary to ensure successful completion of these facilities.

No Action Alternative

No specific mitigation measures have been identified for the NorskeCanada proposal. However, it would have to undertake First Nation consultation necessary to secure approval of its proposed facilities.

Significant Unavoidable Adverse Impacts

With adequate implementation of protective measures, no significant unavoidable adverse impacts would be anticipated.

3.9.3 Issue 2

Issue Summary

Description of Problem

The Final EIS states that a plan has been submitted "in the event that any unanticipated historic properties or human remains are encountered during construction." However, no details on protocol have been provided.

Ecology Requirement

Provide a summary of the plan for unanticipated discovery in the environmental review and specify that this would also be applicable for prehistoric and ethnohistoric properties.

Affected Environment

No additional analysis required.

Impacts

Proposed Action

No additional analysis required.

Terasen Gas Alternative

No additional analysis required.

No Action Alternative

No additional analysis required.

Mitigation Measures

Proposed Action

GSX-US

GSX-US has produced an Unanticipated Discovery Plan that is included in Resource Report 4, Cultural Resources, in Exhibit F-1 of GSX-US's original application to FERC. The plan was accepted by FERC. However, the plan has yet to be reviewed by OAHP and affected Indian tribes and incorporated into a Memorandum of Agreement.

The Unanticipated Discovery Plan proposes that in the event any potential historic properties are discovered:

- Work in the vicinity of the find would be stopped and physical barriers be installed to protect the resource.
- FERC, OAHP, affected Indian tribes and First Nations, GSX-US's archaeological contractor, and the landowner would be contacted.
- The archaeological contractor would evaluate the discovery in consultation with the agencies, Indian tribes, and First Nations and prepare a report with treatment recommendations for their concurrence.
- Construction would resume in the area after the treatment plan had been approved, implemented, and completed.
- If human burials are discovered, the county sheriff and coroner would be contacted; depending on the nature of the burial, GSX-US would follow appropriate state procedures for non-Indian burials or would consult with the agencies, Indian tribes, and First Nations on treatment and accommodate to the extent feasible the concerns and requests of the affected Indian tribes and First Nations, in addition to the above procedures.

GSX-Canada

Refer to Issue 1.

Terasen Gas Alternative

Refer to Issue 1.

No Action Alternative

Refer to Issue 1.

Significant Unavoidable Adverse Impacts

With implementation of mitigation measures, significant unavoidable adverse impacts would not be anticipated.

3.9.4 Issue 3

Issue Summary

Description of Problem

The Final EIS states that much of the proposed pipeline right-of-way follows existing pipeline rights-of-way, which were surveyed for cultural resources in the early 1990s. However, the Final EIS does not specify where the routes diverge or summarize the results of the earlier survey and what implications it offers for the occurrence of cultural resources in the current right-of-way.

Ecology Requirement

Include maps in the environmental review that show those portions of the route that diverge from the existing right-of-way because these areas would presumably have received no prior archaeological surveys. Since the proposed right-of-way follows the existing right-of-way, summarize previous survey results and their implications for cultural resources in the current project area.

Affected Environment

GSX-US surveyed the proposed pipeline route where landowner permission was granted, including areas that were surveyed for cultural resources in the 1990s. Maps showing the survey areas and existing right-of-way appear in the June 2000 cultural resources report (Hess et al. 2000). Previous survey results suggested that environments such as river and stream banks, lake and marine shorelines, wetland and spring margins, and higher ground including terraces, prairies, hilltops, and ridge lines would be more likely to contain archaeological materials (Hess and Thompson 2000). Archaeologists surveyed, evaluated resources, and monitored construction in the late 1980s and early 1990s for the ARCO Ferndale pipeline identifying 17 archaeological sites and 5 historic structures that are located within one mile of the proposed GSX-US pipeline route. Of these resources, 6 archaeological sites are listed as "close," or less than 0.25 mile, to the route (Hess and Thompson 2000). One previously recorded archaeological site, 45WH52 was re-recorded during the 2000 survey although it is located outside of the GSX-US project Area of Potential Effect (APE) (Hess et al. 2000).

Impacts

Proposed Action

No additional analysis required.

Terasen Gas Alternative

No additional analysis required.

No Action Alternative

No additional analysis required.

Mitigation Measures

Proposed Action

Should the pipeline route change making avoidance of cultural sites infeasible, then GSX-US should consult with OAHP and affected Indian tribes. If the resources are determined to be National Register-eligible then a treatment plan should be devised.

Terasen Gas Alternative

Refer to Issue 1.

No Action Alternative

Refer to Issue 1.

Significant Unavoidable Adverse Impacts

With implementation of mitigation measures, significant unavoidable adverse impacts would not be anticipated.

3.9.5 Issue 4

Issue Summary

Description of Problem

The Final EIS states that cultural resource testing was conducted without specifying the methodology (judgmental or random testing? auger probes or shovel tests? depositional settings? depths?)

Ecology Requirement

Summarize the testing methodology in the environmental review so the reviewer can determine the degree to which archaeological visibility and test results were attributable to real distribution patterns or methodological limitations.

Affected Environment

The cultural resources pedestrian survey included surface scrapes on terraces, prairies, upland margins, hilltops and ridge lines. Surveyors augmented the assessment with subsurface probes in river and stream bank, lake and marine shoreline, wetland and spring margin, and higher ground in floodplain environments. Subsurface investigations included excavation of judgmental 4 inch-diameter auger probes to delineate subsurface site boundaries and screening of excavated materials through 1/8-inch wire mesh (Hess and Thompson 2000; Hess et al. 2000). Two sites (37-20 - a historic period debris scatter and 45WH536 - a prehistoric site), for which landowner permission was obtained, were tested. Testing methods included excavating auger probes at the first site, shovel test probes at the second, and approximately 3-foot by 3-foot excavation units at both sites. Subsurface test units were dug to approximately 8 inches below cultural material (Zachman et al. 2000).

Impacts

Proposed Action

No additional analysis required.

Terasen Gas Alternative

No additional analysis required.

No Action Alternative

No additional analysis required.

Mitigation Measures

Proposed Action

No additional analysis required.

Terasen Gas Alternative

No additional analysis required.

No Action Alternative

No additional analysis required.

Significant Unavoidable Adverse Impacts

No additional analysis required.

3.9.6 Issue 5

Issue Summary

Description of Problem

The Final EIS states that the OAHP considers a certain prehistoric site to be significant with the assertion, "that it is not well represented in the archaeological record" without any explanation as to the nature of the site or its contents.

Ecology Requirement

Clearly state the type of site and its features or artifact assemblage in the environmental review to clarify OAHP's assertion of significance.

Affected Environment

OAHP considers archaeological site 45WH536 to be significant. The site is a shallow scatter of prehistoric stone tools, bone artifacts, and fire-cracked rock. Few resources of this type have been recorded in interior western Washington (Whitlam, pers. comm., 2000, 2003; Zachman et al. 2000).

Impacts

Proposed Action

No additional analysis required.

Terasen Gas Alternative

No additional analysis required.

No Action Alternative

No additional analysis required.

Mitigation Measures

Proposed Action

No additional analysis required.

Terasen Gas Alternative

No additional analysis required.

No Action Alternative

No additional analysis required.

Significant Unavoidable Adverse Impacts

No additional analysis required.

3.9.7 Issue 6

Issue Summary

Description of Problem

The Final EIS cites the following five historic cultural resources: 37-15, 37-16, 37-17, 37-19, and 37-20 without identifying eligibility status. Potential indirect impacts on the historic telegraph line/road community of Gera are not discussed.

Ecology Requirement

Include a determination of eligibility for the aforementioned cultural resources in the environmental review and, if found eligible for inclusion on the NRHP, discuss the potential indirect impacts (e.g., visual impacts, etc.) on Gera.

Affected Environment

Site 37-15 (HRA-WH-4H), a historic period wood cutter's camp, may be eligible for listing in the National Register. However, the landowner has denied permission for additional testing of the resource to determine its significance. Site 37-16 (HRA-WH-3H), the Grandview farmstead, is ineligible for listing in the National Register as an archaeological site because no research potential exists in the debris scatter associated with the site. A search of historical documents also indicated that the site was not eligible for listing in the National Register under Criterion B because it is not associated with any person important in local or state history. Site 37-17 (HRA-WH-7H), the South Sumas Road site, is a low-density historic period debris scatter. The site does not retain integrity and is therefore not eligible for listing in the National Register. Site 37-19 (HRA-WH-9H), the Easterbrook Grade site, is another low-density historic period debris scatter that is not significant because it lacks diversity and integrity. Site 37-20 (HRA-WH-6H), the Telegraph Trail site, is a historic period debris scatter near a telegraph route and road associated with the former community of Gera. This site was tested (see Issue 4) and determined not to be eligible for listing in the National Register. The site has no standing structures and would therefore not experience indirect impacts from the GSX-US project (Hess et al. 2000; Zachman et al. 2000).

Impacts

Proposed Action

No additional analysis required.

Terasen Gas Alternative

No additional analysis required.

No Action Alternative

No additional analysis required.

Mitigation Measures

Proposed Action

No additional analysis required.

Terasen Gas Alternative

No additional analysis required.

No Action Alternative

No additional analysis required.

Significant Unavoidable Adverse Impacts

No additional analysis required.

3.9.8 Issue 7

Issue Summary

Description of Problem

The Final EIS did not adequately assess potential impacts on cultural/historic resources of project staging areas, temporary work areas, and access roads.

Ecology Requirement

Facility sites, all project staging and temporary work areas, and access roads should be evaluated for potential impacts on cultural/historic resources. OAHP review comments and opinion should be included or summarized in the SEPA documentation.

The concurrence letter from OAHP for the underwater archeological work should be incorporated in the SEPA document. A subsequent concurrence letter for the onshore portion of the project should also be included or discussion provided in the SEPA document.

Affected Environment

GSX-US surveyed access roads and staging areas as well as a 300-foot-wide corridor centered on the proposed pipeline centerline. During the initial and one supplemental survey in 2000, approximately 4.3 miles of the pipeline right-of-way was not surveyed because of landowner

refusals. The results of additional archaeological survey since then have not been compiled. The results of these studies may identify additional resources in the project area.

Impacts

Proposed Action

No additional analysis required.

Terasen Gas Alternative

No additional analysis required.

No Action Alternative

No additional analysis required.

Mitigation Measures

Proposed Action

No additional analysis required.

Terasen Gas Alternative

No additional analysis required.

No Action Alternative

No additional analysis required.

Significant Unavoidable Adverse Impacts

No additional analysis required.

3.10 TRAFFIC AND TRANSPORTATION

3.10.1 Applicable Sections in FERC Documents

Please refer to Section 3.93 of the FERC Final EIS and Resource Report 5, Socioeconomics, in Exhibit F-1 of GSX-US's original application to FERC.

3.10.2 Issue 1

Issue Summary

Description of Problem

The Final EIS does not contain any meaningful analysis of traffic impacts. Potential traffic impacts associated with roads and railroad crossings have not been included. Without information about traffic and train volumes that would be affected by the pipeline crossing, potential traffic impacts cannot be discussed. Additionally, local transportation plans, programs, and capital projects are not mentioned. No estimate is provided of the number of trips or the distribution/assignment of vehicle trips to the transportation network, nor is a cumulative impact analysis provided.

Ecology Requirement

Include a thorough discussion of auto and train traffic impacts associated with construction and operation of the project in the environmental review.

Affected Environment

Existing Road Network

The local highway system near the proposed route through Whatcom County is well developed. The principal roadway in the county, I-5, links Bellingham with British Columbia to the north and Seattle and the Puget Sound area to the south. SRs 9, 539, 542, 544, and 548 traverse the rest of Whatcom County. Most public roads near the proposed route are paved. However, none of the roads has curbs, gutters, or sidewalks.

SR 548 was recently improved from I-5 to Blaine Road through the addition of a pavement overlay and improved pavement markings and traffic signs. The roadway has 11-foot-wide lanes, 8-foot-wide paved shoulders, drainage ditches, and wire fences on both sides. The posted speed limit is 50 mph.

In addition to state routes, other public roads in the pipeline vicinity are county roads such as Grandview Road, which is west of Blaine Road. The county roads in the area are principally two-lane rural roads. The speed limits are generally 50 mph, except in more developed areas such as the Birch Bay area, and near Blaine, Ferndale, and the I-5 interchanges, where the speed limits are 35 mph.

Impacts

GSX-US

Construction

Table 3.10-1 lists the anticipated workforce, schedule, and construction duration for the major components of the GSX-US project construction.

Table 3.10-1: Estimated Construction Workforce for the GSX Project

Facility	Size of Workforce	Schedule		Duration (days)
		Start	End	
Pipeline Facilities Onshore	225 to 300	August 2004	October 2005	306 (includes winter break approx. Oct 2004 – Apr 2005)
Cherry Point Compressor Station	80 to 100	March 2005	October 2005	155
Sumas Interconnect Facility	20 to 30	May 2005	October 2005	111
Total	325 to 430			

Source: Williams Pipeline Company 2003

Construction Workforce: Temporary impacts on traffic during project construction could result from the daily commuting of the construction workforce to the construction site. GSX-US estimates that approximately 100 people would be working on the onshore pipeline at any one time. The majority of these individuals would travel to the Portal Way Staging Area from various locations early in the morning and return in the evening during non-peak traffic hours. Table 3.10-2 shows the anticipated routes construction workers would take to reach the Portal Way Staging Area from various locations in the region (Williams Pipeline Company 2003).

Road Crossings: Construction at road crossings could also affect traffic. Road crossings are installed using either a boring technique or an open cut. Major paved roads generally would be crossed by boring or drilling underneath the road. Little or no disruption of traffic would result at road crossings that are bored or drilled. The open-cut construction method would be used across lightly traveled paved or graveled roads and unimproved rural dirt roads. GSX-US will attempt to maintain at least one lane of traffic with detours around construction, plating over the open portion of the trench, or other suitable methods when open cutting a road. However, in a worst-case scenario, this construction method may require the road to be closed for about 24 hours. Traffic control measures such as flaggers, warning signs, lights, and barriers would be used during construction to ensure safety and to minimize traffic congestion.

GSX-US would use existing roads to provide access to the construction right-of-way. In most cases, the existing roads are paved or graveled and would not require improvement for access. In some cases, narrow roads or two-track roads would be improved to provide suitable access for construction. GSX-US has identified 27 roads that, if modified, would result in approximately 8.8 acres of disturbance. Table 3.10-3 lists the name and general location of proposed road crossings and identifies the type of improvements that would be required at each road.

Table 3.10-2: Anticipated Construction Worker Travel Routes

Destination	Worker Origin					
	Bellingham	Birch Bay	Blaine	Ferndale	Lynden	Sumas
Portal Way Staging area	North on I-5 to exit 270, north on Portal Way	East on Birch Bay – Lynden Road; north on Portal Way	South on Portal Way	North on Portal Way or I-5 to exit 270, north on Portal Way	West on Birch Bay – Lynden Road; north on Portal Way	Highway 9 to 546 to 539; west on Birch Bay – Lynden Road; north on Portal Way
Gulf Road Staging area[1]	North on I-5 to exit 262, west on Mt. View, Rainbow and Henry Roads to Gulf Road	South on Blaine Road, east on Grandview, south on Kickerville, west on Henry	South on Blaine Road, east on Grandview, south on Kickerville, west on Henry	West on Mt. View, Rainbow and Henry Roads to Gulf Road	West on Lynden – Birch Bay, south on Kickerville, west on Henry Road	Highway 9 to 546 to 539, west on Lynden – Birch Bay, south on Kickerville, west on Henry Road
Sumas Staging area	Highway 539 to 546 to 9	East on Lynden – Birch Bay to 539 to 546 to 9	South on 548, Portal Way or I-5 to Birch Bay route	West Axton to 539 to 546 to 9	East on 546 to 9	Rock Road, Highway 9 and local roads
Ferndale Staging area	North on I-15 to exit 263, south on Portal Way	East on Lynden – Birch Bay to I-5 or Portal Way, south to Ferndale	South on I-5 or Portal Way to Ferndale	Local roads	South on 539, west on West Axton	Highway 9 to 546 to 539, west on West Axton
Port of Bellingham	city roads	South on I-5 to city roads	South on I-5 to city roads	South on I-5 to city roads	South on 539 to city roads	South on 9 to 546 to 539 to city roads

Source: Williams Pipeline Company 2003

Table 3.10-3: Major Roads Crossed by the GSX Project and Proposed Crossing Method

Milepost	Road/Railroad Name	Proposed Crossing Method
0.01	Jones Road	Open Cut
0.67	Rock Road	Open Cut
1.54	Hillview Road	Open Cut
1.71	Reese Hill Road	HDD (with Saar Creek)
2.42	Sumas Road	Open Cut
2.90	Morgan Road	Open Cut
2.92	Hovel Road	Open Cut
4.41	Garrison Road	Bore
5.42	High School Road	Open Cut
6.49	Van Buren Road	Bore
7.58	Trapline Road	Open Cut
9.64	Clay Road	Open Cut
10.20	Northwood Road	Open Cut
10.96	Bloom Road	Open Cut
11.86	Bender Road	Open Cut
12.37	Depot Road	Open Cut
12.88	Benson Road	Open Cut
13.38	Double Ditch Road	Bore
13.89	Guide Meridian Road	Bore
14.66	Jackman Road	Open Cut
15.18	Axling Road	Open Cut
15.96	Weidkamp Road	Open Cut
16.97	Markworth Road	Open Cut
18.99	West Badger Road	Bore
19.77	Sunrise Road	Open Cut
21.00	Loomis Trail Road	Open Cut
21.70	Delta Line Road	Open Cut
22.24	Stein Road	Open Cut
22.81	Custer School Road	Open Cut
24.06	Valley View Road	Open Cut
24.62	Interstate 5	HDD
24.79	Portal Way	Bore (with railroad on west side)
25.16	Birch Bay Lynden Road	Bore
26.26	Arnie Road	Open Cut
26.83	Ham Road	Open Cut
28.13	Kickerville Road	Open Cut
28.48	Bay Road	Open Cut
30.28	Blaine Road	Bore
31.02	Safsten Road	Open Cut
31.30	Jackson and Grandview Roads	Bore
31.82	Brown Road	Open Cut
32.51	Aldergrove Road	Open Cut

Source: Williams Pipeline Company 2003

Construction Vehicle Traffic: The existing roadway system in the project area could be temporarily affected by the movement of construction vehicles and delivery of construction equipment and materials to pipeline site. GSX-US consulted with the Whatcom County Traffic Engineer to identify areas where construction traffic impacts could occur. The intersection of

Morgan, Hovel, and Telegraph roads was identified as an area where congestion could potentially become an issue during construction (Vandersypen, pers. comm., 2003).

Four contractor yards would be used on a temporary basis to support construction activities.

- The Sumas Pipe Storage Yard is a 13.2-acre site approximately 0.5 mile west of Sumas. The site has been partially graded for development and has been previously used for storage and staging during pipeline construction projects. The yard is adjacent to a railway siding used for shipping across the United States-Canada border and would be accessible from SR 9.
- The Portal Road Yard is a 22.6-acre site approximately 4 miles southeast of Blaine. The site is located between I-5 and Portal Road.
- The Swift Yard is an 18.7-acre site currently used as a railway siding and is adjacent to Portal Road approximately 3 miles southeast of Blaine.
- The Ferndale Yard is about 0.25 mile north of Ferndale. The 14.1-acre site has a railway siding along its western edge and is accessible to I-5 via an adjacent exit ramp and bridge.

Approximately 80 workers would be transported to the job site and back again at the end of the day on crew buses. The remaining individuals (approximately 20 pickups) would be moving from site to site on the construction right-of-way using local roads and highways on a daily basis. It is expected that these vehicles would make two to three daily trips from the Portal Way Staging Area to various areas along the construction project as construction occurs at multiple locations.

Approximately three to four pipe string trucks would be making two roundtrips per day from the Portal Way site to the construction right-of-way for the duration of project construction. It is also expected that water trucks and dump trucks would make as many as six trips per day (on average) to deliver materials and equipment to the right-of-way. Once a vehicle leaves the Portal Way yard, its exact route would vary depending on the current location of construction activity. Whatcom County has not identified any restrictions on the access roads that would affect project construction (Williams Pipeline Company 2003).

Overall, the number and frequency of construction vehicle trips would be low on any particular roadway at any one time because construction would move sequentially along the project right-of-way. Trips by vehicles that would visit the right-of-way on a regular basis (e.g., pickup trucks, crew bus) would be distributed along the length of the pipeline route as the pipe string is installed and construction activity progresses to a different part of the right-of-way.

Cumulative Impacts

The only other area of concern identified by the County Traffic Engineer is the potential cumulative impact of construction traffic from simultaneous construction of the BP Cherry Point Cogeneration Project (at the BP Refinery) and GSX pipeline construction in the same area (Vandersypen, pers. comm., 2003). GSX-US construction activities that could overlap with construction at the BP site includes the HDD site, the pipeline between the HDD site and the Cherry Point compressor, the Cherry Point compressor itself, the section of pipeline east of the

compressor station along Grandview Road, and assembly of the HDD pipe string at the Gulf Road launch site.

The Applicant for BP Cherry Point has estimated the number of vehicle round trips each month during construction, assuming mobilization in February 2004 through December 2005. The average weekday construction trips are estimated to be 650. The average weekday peak construction trips are estimated to be 1,200 (Duke/Fluor Daniel 2001). This is equivalent to approximately 10,300 monthly round trips during the peak construction period.

While specific routings are not known at this time, truck traffic would most likely use the principal arterials or roadways from material sources to the cogeneration facility. Potential impacts could affect roadway and/or intersection operations thereby worsening levels-of-service (LOSs) or increasing queue lengths or delays. The traffic analysis for the BP Cherry Point project estimates that the SR 548/Portal Way intersection would operate at LOS F during the PM peak hour during peak construction conditions without any mitigation.

Operation

GSX-US estimates it would hire up to two additional permanent employees to satisfy the day-to-day operation requirements of the completed pipeline project. These employees would be hired and trained at the Sumas District work location and would spend the majority of their time at the Cherry Point compressor station. Because only minimal traffic would be associated with operation and maintenance of the completed pipeline, no significant operational traffic impacts are expected.

GSX-Canada

Construction

At peak construction, the GSX-Canada project would employ approximately 240 workers. Four to five buses would bring workers to the site and then return to pick up workers. This would result in 8 to 10 one-way traffic movements per day from the marshalling area to the project site. In addition, up to 400 one-way movements would occur to and from the marshalling area. Supervisors and selected other workers who need their vehicle during the day may travel to the site in vehicles such as light trucks. It is anticipated that a maximum of 20% of the workforce would use independent vehicles. This would result in a maximum of 80 one-way vehicle trips per day. Buses and vehicles coming to the project site would park on the right-of-way.

The contractor would use from three to six stringing trucks, with each truck carrying from 10 to 12 40-foot or 42-foot joints of NPS16 pipe. This would result in from 200 to 254 one-way trips to and from the right-of-way to the stockpile site. These trips would be distributed over the entire construction period.

Operation

No additional analysis required.

Terasen Gas Alternative

No traffic impact analyses are available for the Terasen Gas Alternative.

No Action Alternative

No traffic impact analyses are available for the NorskeCanada proposal.

Mitigation Measures

Proposed Action

Construction

GSX-US would prepare and implement a Construction Transportation Management Plan (CTMP). Components of the CTMP would include, but not be limited to, the following:

- Construction employees would share rides or be bused to the construction right-of-way. To reduce overall traffic, construction workers would leave personal vehicles at the contractor's yard and share rides or ride buses to the construction right-of-way.
- Construction employees would commute during off-peak hours. Because pipeline construction work is generally scheduled to take advantage of all daylight hours, workers would commute to and from the site in off-peak hours.
- Construction equipment would remain onsite during construction of the pipeline. In addition, most equipment would be located on the pipeline right-of-way and would not affect traffic on local roads after its initial delivery to the construction site.
- GSX-US would require construction workers to use contractor yards as the primary parking area for their personal vehicles. Workers would be transported from contractor yards by buses provided by the contractor. Transporting workers by bus would reduce traffic and eliminate the need for personal vehicles to be parked along the right-of-way or along roadsides near the right-of-way.
- When a pipeline crossing requires an open cut of a road, GSX-US would attempt to maintain at least one lane of traffic with detours around construction, plating over the open portion of the trench, or other suitable methods. Traffic control measures such as flaggers, signs, lights, and barriers would be used during construction to ensure safety and to minimize traffic congestion.
- GSX-US would apply for all necessary permits to cross and/or use roads.
- To minimize disruption by construction traffic, GSX-US will use contractor yards to ensure adequate roadway access to pipeline construction areas. Construction equipment would most likely be transported to the area via I-5 and delivered to the construction right-of-way on low-boy semi-trucks. Some equipment would be stored at the Portal Way site. This equipment would be dropped off in one location and moved in a linear direction along the

construction right-of-way. The amount of equipment moving from site to site would be minimal.

- Construction hours would be strictly adhered to as follows:
  - Marine: 24-hour-a-day operations.
  - All HDDs, including Cherry Point: from 10 to 12 daylight hours of operation to 24-hour-a-day operations during some phases.
  - Onshore construction: an average of 10 to 12 daylight hours of operation with a small number of cases in which this would be exceeded.
- GSX-US and its contractors would comply with local road weight limits and restrictions and would keep roads free of mud and other debris that may be deposited by construction equipment. Track-driven equipment would cross roads on tires or equipment pads to minimize road damage. Any roadways damaged by construction activities would be repaired.

Operation

No mitigation measures required.

Terasen Gas Alternative

No traffic impact analyses are available for the Terasen Gas Alternative.

No Action Alternative

No traffic impact analyses are available for the NorskeCanada proposal.

Significant Unavoidable Adverse Impacts

No significant unavoidable adverse impacts have been identified.

3.11 AIR QUALITY

3.11.1 Applicable Sections in FERC Documents

Please refer to Section 3.12 in the FERC Final EIS and Resource Report 9, Air and Noise Quality, in Exhibit F-1 of GSX-US's original application to FERC.

3.11.2 Issue 1

Issue Summary

Description of Problem

The air quality section does not discuss wind patterns in the project area. Therefore, it is not possible to determine if specific residential locations may be more susceptible to emissions than other locations.

Ecology Requirement

Include an analysis and discussion of wind patterns for the project area and surrounding region in the environmental review.

Affected Environment

According to data from the National Oceanic and Atmospheric Administration's monitoring program (1994-1999), the average wind speed over a six-year monitoring period was 9 miles per hour (mph). Over that six-year period, the month of January had the highest average wind speed of 9.7 mph and August had the lowest at 7.9 mph. Prevailing wind direction over the monitoring period was 190°. Wind roses from the Bellingham International Airport show a similar trend with the wind blowing from the south to north between the years of 1991-1995.

Impacts

Proposed Action

No additional analysis required.

Terasen Gas Alternative

No additional analysis required.

No Action Alternative

No additional analysis required.

Mitigation Measures

Proposed Action

No additional analysis required.

Terasen Gas Alternative

No additional analysis required.

No Action Alternative

No additional analysis required.

Significant Unavoidable Adverse Impacts

No additional analysis required.

3.11.3 Issue 2

Issue Summary

Description of Problem

Under the heading State and Local Regulations, the air quality section of the Final EIS states that, "GSX-US performed preliminary dispersion modeling that indicates impacts below the ASILs." However, no dispersion mapping is presented.

Ecology Requirement

Include dispersion mapping in the environmental review so that destination areas for project emissions may be identified.

Affected Environment

No additional analysis required.

Impacts

Proposed Action

GSX-US

With regard to the GSX-US project, WAC 173-400-110 states that an emission source is subjected to the Prevention of Significant Deterioration (PSD) permitting program if the new installation is either a major modification to an existing major source or is a major source by

itself. Regulated pollutants (nitrogen oxides, carbon monoxide, sulfur dioxide, volatile organic compounds, or particulate matter less than 10 micrometers in size) of major sources have the potential to emit pollutants above what is allowed. Each component (turbine, generator, dehydration unit, and boiler) of the GSX Cherry Point compressor station was modeled and compared to the PSD threshold of 250 tpy. If results showed that the regulated pollutants were above the PSD threshold, further analysis would be necessary. However, results showed that each component of the compressor station is below the PSD major source threshold of 250 tpy. Therefore, the GSX Cherry Point compressor station is not subject to the requirements of the PSD program, and in turn no dispersion modeling is required.

GSX-Canada

In its July 2003 ruling on the GSX-Canada project, the Joint Review Panel concluded that any air quality emissions resulting from the project would be minimal. With respect to greenhouse gases, the panel concluded that, although emissions from the project are very minor in comparison to overall emissions on Vancouver Island, they would contribute to climate change by combining and interacting with emissions from other present and future sources from around the world. However, the panel relied on Environment Canada's statement that because emissions resulting from new natural gas pipeline and energy generation projects have been factored into the Government of Canada's outlook, the GSX-Canada project should not compromise Canada's ability to achieve its Kyoto Protocol target.

Terasen Gas Alternative

The proposed compressor stations would require air emission permits under Section 10 of the Provincial Waste Management Act. Legislative authority to issue air emission permits for such facilities rests with the Oil and Gas Commission. TGVI plans to use "dry" low nitrogen oxide (DLN) technology. The DLN technology easily achieves these permit requirements. Such permits and/or permit modifications typically take approximately four months to process, and can be done at the same time with other planning and construction activities (GSX-Canada Application, Appendix D, pg. D-8).

At the LNG facility, equipment that uses hydrocarbon fuel would meet regulatory air emission guidelines. However, the primary compression and pumping equipment at the facility would be electric, thereby minimizing air emissions (GSX-Canada Application, Appendix F, pg. F-6).

No Action Alternative

NorskeCanada does not expect any material impact on the air quality of these communities as a result of the cogeneration facilities. All ambient air quality parameters are expected to continue to meet provincial and federal objectives.

The installation of the cogeneration facilities at the Crofton, Elk Falls, and Port Alberni mills would result in some increased air and water emissions. The Elk Falls and Port Alberni gas turbines would normally use natural gas for firing, but would have distillate capability in the event of natural gas curtailments. Key air emissions would be nitrogen oxides, carbon monoxide,

sulfur dioxide, carbon dioxide, volatile organic compounds, ammonia, and low levels of fine particulate.

Under the project proposal, fossil fuel-fired boilers at Crofton, Elk Falls, and Port Alberni would be on standby for all but 10 to 12 days per year when they are required during annual shutdowns of each mill's hog fuel-fired power boilers. This standby status for the fossil fuel-fired boilers would offset some of emissions generated by the new gas turbines installed at each site.

Incremental air emissions and effluent discharges from the infrastructure would be distributed across NorskeCanada's three Vancouver Island pulp and paper facilities. The distribution of these emissions along with the standby status of existing fossil fuel boilers and the lower quantity of natural gas required by the initiative mean that the impact on ambient air quality is almost certainly lower than that modeled for VIGP.

Greenhouse gas emissions estimates are based on the total use of natural gas and distillate fuels at each of the mills. Overall, the net effect of project implementation from its Vancouver Island mills would be an increase of 660,336 tons of carbon dioxide equivalent per year. This represents only 80% of the planned increase with the VIGP (NorskeCanada 2003).

Mitigation Measures

Proposed Action

No additional analysis required.

Terasen Gas Alternative

Additional information on air quality mitigation is not available.

No Action Alternative

NorskeCanada anticipates use of DLN gas turbines in conjunction with proven emissions controls to meet both the provincial and federal air emissions standards relating to the operation of gas-fired turbogenerators. Plans call for the installation and operation of selective catalytic reduction technology that uses ammonia to convert exhaust gas nitrogen oxides into harmless nitrogen and water. DLN duct burners would also be incorporated into each of the facilities for intermittent operation.

NorskeCanada's 2002 greenhouse gas emissions were 59% below 1990 levels, which surpasses Canada's commitment to the Kyoto Protocol of a 6% reduction below 1990 levels.

Significant Unavoidable Adverse Impacts

No significant unavoidable adverse impacts have been identified.

3.12 NOISE

3.12.1 Applicable Sections in FERC Documents

Please refer to Section 3.12.2 in the FERC Final EIS and Resource Report 9, Air and Noise Quality, in Exhibit F-1 of GSX-US's original application to FERC.

3.12.2 Issue 1

Issue Summary

Description of Problem

A pipeline noise impact and mitigation plan should be developed and summarized in the SEPA review documentation.

Ecology Requirement

Develop and summarize pipeline noise impact and a mitigation plan in the SEPA review documentation to allow for a full evaluation and public review of impacts and mitigation measures.

Affected Environment

No additional analysis required.

Impacts

Proposed Action

GSX-US

Two additional studies were conducted for GSX-US to analyze the operation of the Cherry Point compressor station and gas flow through the pipeline. The studies assessed the potential for sounds to be emitted from the walls of the marine pipeline. Those studies are:

- Kitech, Paul D. P.E. February 2003. GSX Canada Pipeline Project: Results of a Supplemental Acoustical Analysis of the Potential Noise of the Underwater Pipeline Associated with the GSX Project. Hoover & Keith, Inc.
- Marko, J. R. February 2003. Consideration of Evidence for Noise Generation by Underwater Gas Pipelines and Presentation of Laboratory Data Relevant to the Acoustic Insulation Properties of Concrete Pipeline Cladding. ASL Environmental Sciences, Inc.

The Marko study (2003) presents measurements of pulsed sound propagation through bare- and concrete-coated steel plates and longitudinal pipe sections. The results suggest that the planned encasement of the proposed GSX pipeline in 1.6 inches of concrete would reduce the purported

pipeline-generated noise to levels below those attainable in the quietest deep ocean locations. Further, these noise levels are well below existing estimates of the minimum orca auditory threshold.

The Kitech analysis (2003) contained a more realistic flow velocity inside the GSX pipeline and a further interpretation of the existing Centra Gas pipelines. Results indicate that, at a distance greater than 3.28 feet, noise that radiates from the underwater section of the pipeline would be below the minimum hearing threshold for marine mammals. In addition, because underwater sound from a noise source decays until a surface is encountered, pipeline noise would be even lower at moderate distances from the pipeline than the estimated level at 3.28 feet.

The results of the two studies show that the proposed pipeline would not generate sounds of high enough frequencies and intensities to negatively affect marine life.

GSX-Canada

GSX-Canada predicted an increase in construction-related noise during working hours throughout construction despite best efforts to minimize the effects. During operations, noise would occasionally occur as a result of maintenance vehicles in the area, weekly flyovers of the right-of-way, maintenance activities at the Centra interconnection, and scheduled blowdowns. The Joint Review Panel concluded that, given GSX-Canada's proposed mitigation measures, significant adverse noise impacts would be unlikely.

Terasen Gas Alternative

As with the proposed action, operational noise would be associated primarily with the increase in compression horsepower at three new sites and upgrades at other stations. Typical sources of noise at the compressor stations would include the turbine air intake, turbine exhaust, turbine lube oil cooler, turbine machinery surfaces, gas interstage coolers, and gas aftercoolers. Actual impacts would depend on the final location of the station, and its proximity to noise-sensitive areas.

Potential noise impacts resulting from pipeline looping would be associated with pipeline construction and would be similar to the proposed action. Noise emitted from the LNG facility would be minimal and limited to rotating machinery (Terasen Gas 2003).

No Action Alternative

Additional noise generated by the cogeneration facilities is not expected to materially affect the existing noise profile at the NorskeCanada sites. Noise emissions at the facilities would be controlled to a maximum of 85 decibels (dB). At a distance of 46.3 feet from the facility, noise levels would be 50 dB, or equivalent to the ambient level in an office environment (NorskeCanada 2003).

Mitigation Measures

Proposed Action

Because the two noise studies that were reviewed show the proposed pipeline would not generate sounds of high enough frequencies and intensities to negatively affect marine life, no additional mitigation is required.

Terasen Gas Alternative

Measures to minimize noise impacts at the compressor station would be similar to the proposed action and include special silencers on the turbine air intake and exhaust, locating the turbine in an acoustically treated building, and gas aftercoolers. At the LNG facility, the liquefaction compressor and vaporization pumps would be electric and housed in acoustical structures designed to attenuate noise emissions. Noise levels at all facilities would comply with all applicable federal and provincial regulations.

No Action Alternative

Operation of equipment at all of the NorskeCanada mills is in compliance with ISO 9000 and ISO 14000 registration, and all applicable provincial and federal regulations.

Significant Unavoidable Adverse Impacts

No significant adverse impacts have been identified.

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5. ACRONYMS AND ABBREVIATIONS

APE	Area of Potential Effect
BC Hydro	British Columbia Hydro and Power Authority
Bcf	billion standard cubic feet
BCUC	British Columbia Utilities Commission
BMPs	Best Management Practices
CTMP	Construction Transportation Management Plan
CZM	Coastal Zone Management
dB	decibels
DLN	dry low nitrogen
Ecology	Washington Department of Ecology
EIS	Environmental Impact Statement
EPR	Emergency Preparedness and Response Program
ESEIA	Environmental and Socio-Economic Assessment
FERC	Federal Energy Regulatory Commission
GIS	geographic information system
GMA	Growth Management Act
gpm	gallons per minute
GSX	Georgia Strait Crossing
GSX-Canada	Georgia Strait Crossing Pipeline Limited
GSX-US	Georgia Strait Crossing Pipeline LP
HDD	horizontal directional drill
IAP	Integrity Assessment Program
LNG	liquid natural gas
LOSs	levels-of-service
MLLW	mean lower low water
MOUs	Memoranda of Understanding
MP	milepost
mph	miles per hour
MW	megawatts
NEB	National Energy Board of Canada
NEPA	National Environmental Policy Act
NMFS	National Marine Fisheries Service
NPDES	National Pollutant Discharge Elimination System

NRHP	National Register of Historic Places
OAHP	Office of Archaeology and Historic Preservation
OHWM	ordinary high water mark
OPS	Office of Pipeline Safety
PSD	Prevention of Significant Deterioration
ROW	right-of-way
SCADA	supervisory control and data acquisition
SEPA	State Environmental Policy Act
SPCC	Spill Prevention Control and Countermeasures
TGVI	Terasen Gas Vancouver Island, Inc.
TMP	thermomechanical pulp
tpy	tons per year
UGAs	Urban Growth Areas
USFWS	U.S. Fish and Wildlife Service
VIEC	Vancouver Island Energy Corporation
VIGP	Vancouver Island Generation Project
WDFW	Washington Department of Fish and Wildlife
WRIA	Water Resource Inventory Area
WUTC	Washington Utilities and Transportation Commission

6. DISTRIBUTION LIST

Federal Agencies

NOAA Fisheries
US Fish and Wildlife Service
US Environmental Protection Agency
US Army Corps of Engineers, Seattle District
National Park Service
USDA Forest Service
USDA Resources Conservation Service
Federal Energy Regulatory Commission
Bonneville Power Administration

Tribal and First Nations

Nooksack Tribe
Lummi Nation
Sencot'en Alliance
Tulalip Tribes

Canadian Governments and Agencies

National Energy Board
British Columbia Utilities Commission
British Columbia Ministry of Water Land and Air Protection
British Columbia Ministry of Attorney General
Environment Canada Pacific and Yukon Region
Health Canada - BC/Yukon Region
Greater Vancouver Regional District
Fraser Valley Regional District

State Agencies and Elected Officials

EFSEC
EFSEC Counsel for the Environment
Department of Ecology NWRO
Department of Ecology – SEPA Unit
Department of Fish and Wildlife
Department of Health
Department of Community, Trade and Economic Development
Department of Transportation
Department of Natural Resources
Washington Utilities and Transportation Commission
Senator Harriet Spanel
Senator Dale Brandland

Representative Dave Quall
Representative Jeff Morris
Representative Doug Erickson
Representative Kelli Linville

Local Agencies

City of Bellingham
City of Blaine
Northwest Air Pollution Authority
Port of Bellingham
San Juan County
Whatcom County Fire District No. 7
Whatcom County Planning and Development Services
Whatcom Public Utility District No 1
Whatcom County Department of Emergency Management
Whatcom County Marine Resources Committee
Whatcom County Executive
Whatcom County Council
Whatcom County Prosecutors Office

Libraries

White Rock Public Library
Ocean Park Library
Washington State Library
Bellingham Library
San Juan County Library
Whatcom County Library

Organizations and Individuals

BP Cherry Point Refinery
RE Sources
GSX Concerned Citizens Coalition
REBOUND
Fuel Safe Washington
People for Puget Sound
Nanaimo Newcastle Neighbours Ratepayers Association
Puget Sound Crabbers Association
Safe Bellingham
Seigman Family Trust

Dave Mendelsohn
Jennifer Johnson
Bonnie Lyon

Jim Johannessen
Darrel J. Barnes
Alan Bell
Don Littrell
Darrel Barnes
Marianne Reed
Gerry Fearon
Ray George
Kelly Bell
Doug Dobyns
Mike Kaufman
Connie Hoag
Dave Determan
Aimee McDonald
Terry Bronkeman
Loni Tromburg
Don Neilsen
Dr. Sheila F. Helgath
Willy Lynch
Michael Kaufman
Robert L. Bumford
Richard Gilda
Terrie Klinger
Budd Askew